THE TRADE REVIEW

AND WESTERN MACHINIST.

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New Machinery.

IMPROVED STEAM BOILERS.

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The Firmenich Safety Boiler.

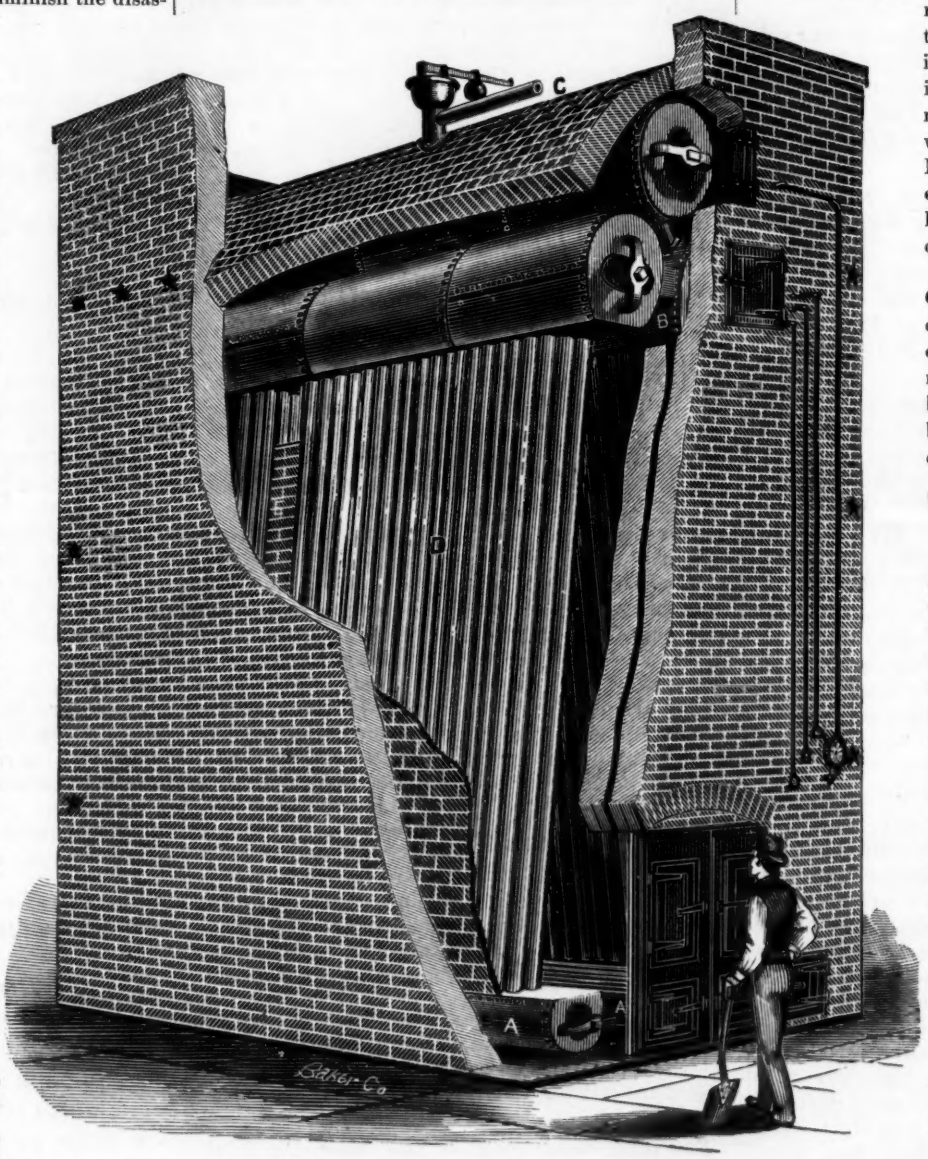
The steam boiler on which are based the most revolting inventions of the last and present century, strange as it may appear, is substantially the same to-day as it was at the close of the last century; while its dangers, owing to the increased demands as to pressure and other qualities, have increased many fold. Only of late years this subject is receiving a portion of the attention which it should have had many years ago, as this is the only direction in which we may hope to diminish the disastrous consequences due to the conservative use of the old-fashioned boilers. But, not only that, the latter are dangerous to life and property; they are also wasteful as regards the consumption of coal, and economy in the use of coal is of great and growing importance, it being estimated that over one-half of the 300,000,000 tons of coal mined annually, is used for the production of steam. Foremost in the stages of progress in the direction of bringing about both a more economical use of fuel, and a safe and durable producer of steam, not liable to explosion, is the boiler illustrated in the adjoining cut; which is invented by Messrs. Firmenich in accordance with which fact it is termed the Firmenich Safety Steam Boiler.

The invention of this boiler, like many other useful inventions, is a child of necessity. The inventors having been engaged for years in the manufacture of grape sugar and syrup, and, running continually night and day, the boilers were taxed quite severely, the consequence of which was, they needed constant repairs, occasioning great loss by stopping, and also kept the owners in continual fear lest some of the boilers should explode, which would have caused great loss of life and property. This fear of explosion also caused them to use steam of low pressure where high pressure steam was best suited for their purposes. Another great source of loss was occasioned by the flues of their boilers becoming filled with soot and ashes. This, they believed to have caused a great waste of fuel, especially in the night running, as the firemen were then apt to be more neglectful than during the day run. Their manufactory being continually on the increase, led them to think how to devise and construct a boiler that would be safe from disastrous explosion; that would require no flue scraping; that would stand the extra severe test of running continually night and day, and would still possess the utmost durability; that would furnish dry and high pressure steam (100 lbs. or more); and last but not least, a boiler that would be economical, as their coal bills were quite a serious item.

These severe requirements, it would appear, were satisfactorily met by the construction of the above boiler.

As to economy of this boiler, the most satisfactory evidence can be produced, based on several tests made by the best authorities in the land. We mention the tests made at the exposition in Philadelphia, those made by Prof. R. H. Thurston, of the Stevens Institute, and those made under the direction of the Commission of U. S. Inspectors of Lake Boilers, by request of New York State insane asylum, all of which agree in giving the palm of economy and safety to the Firmenich boiler.

As regards safety of this boiler, it may be stated, that the tubes of which this boiler is constructed are tested to 500 pounds pressure per square inch, and, should any ever burst from extreme cases, no serious damage can ensue. The diameter of these tubes is from 2 to 3 inches; therefore, should any of them ever burst, it could do no more damage than opening the blow-off cock, or lifting the safety valve, as the outlet can in no case be greater than that of the tubes themselves (2 to 3 inches). The first Firmenich boiler ever made has now been in steady use night and day, Sundays and all, for over seven years, and would, in reality, be equal to 14 years or more when compared with the ordinary usage of common boilers, and is as good to-day as when first put up; a fact which speaks more eloquently than words can in behalf of the durability of this boiler.



THE FIRMENICH SAFETY STEAM BOILER.

Another point in favor of the durability of the Firmenich boiler is its perfect circulation, caused by the tubes in the back chamber being away from the direct action of the fire; this causes a strong downward current of water in them to replace the water evaporated in the furnace. depositing the greater part of the scale in the mud drums, thereby lessening greatly the amount of scale and increasing the the durability of the boiler as well as its economy.

Another advantage claimed for the Firmenich boiler is that it does not allow any foaming or priming, and furnishes entirely dry steam; it is given out by the best authority, that the Firmenich boiler was the only one that made dry steam at the Centennial, without being obliged to superheat it, it being 40 to 50 degrees hotter than that of any other boiler on exhibition.

As will be seen from the cut, all its parts can be easily inspected, and any deposit that may have been formed may be readily removed. The first cost of a Firmenich boiler, when everything is considered, is but a trifle more than other good boilers, and from its peculiar construction, large fire chamber, all parts being removed from excessive heat, equal expansion, no soot, or ashes lodging on any part of it, its good circulation, keeping all its parts at an uniform temperature, it will easily be seen that the occasion for repairs must be necessarily slight; but, even should, from carelessness, repairs become necessary, as sometimes they may, the ease with which it can be done, cannot but commend itself to steam users. As a more recent reference to very large boilers we may mention the Collier White Lead Works, of St. Louis, the Southern Mills Bagging Co., and the Anheuser Busch Brewing Association also of St. Louis.

Messrs. Geo. C. Morgan & Co., of Chicago, have issued a little pamphlet on the subject of this boiler, which contains a large number of testimonials from manufacturers of starch, beer, gas, etc., which should be read by every one contemplating the purchase of steam boilers.

Building Engines on the Manufacturing System.

"Chordal" in American Machinist: A friend of mine, one of the best mechanics in the United States, by the way, showed me a small steam engine which he proposed to build upon the manufacturing system, so far as that system would be justified by the character of the machine. There were but few sizes; they were to be built in large quantities, and the general design seemed to fit it peculiarly for the operation of special machines. The gentleman referred to had nothing to do with the design of the machine. He was to be merely the manufacturer. I saw him a short time ago, and on his own premises, but saw very little which looked like special appliances. I asked the cause, I was answered without words. I was shown a big tapering hole in a part of an engine, and then I was shown a big pile of magnificent reamers for producing these tapering holes for the various sizes of engines, and then I was shown another one of these same parts, and behold! it had a straight hole in it. Expressed in language, the story will read as follows: The model has a taper hole in it; here are five hundred dollars' worth of reamers to make the taper hole, and fifty dollars' worth of gauges to test the taper hole. Before the tools were done we abandoned the taper hole, and the question arises whether it will pay to commence the special tools for the straight hole?

To ascertain the economic gain due to steam jacketing the cylinder and piston, with steam of the boiler pressure, the cost of the total horse power, must be compared in the case of jacketing, taking care that in both cases the initial steam pressure on the piston and the mean back pressure against it, the measure of expansion with which the steam was used, the speed of the piston, and the total horse power developed by the engine, are about the same.

Manufactures.

OHIO INDUSTRIES.

CLEVELAND.

THE Cleveland Electric Co., with a capital of $100,000, was incorporated the past week.

THE Cleveland Rolling Mill Co.'s bar mill is running on half-time, all the other departments on double turn.

WM. CHISHOLM'S SONS report the shovel trade dull, with no change in prices. The prospects are good, however, for the Fall trade.

CLEVELAND grindstone manufacturers report trade good. They say that prices are maintained, and the volume of business is equal to, if not better than last year.

MESSRS. Adolph Schacht, Otto Seefred, John F. Frese, C. L. Hotze and Charles Broderick are the incorporators of the Buckeye Brown Manufacturing Co., of Cleveland.

IT is proposed to form a company with $20,000 capital to manufacture machines and lamps for the new electric light exhibited at the works of the old Sheridan Nail Company's in the Eighteenth ward, last week.—[South Cleveland Advocate.

THE Cleveland Telephone Exchange was sold Monday to a Lowell, Mass., syndicate for $412,500 cash. This was at the rate of $275 per $100 worth of original stock. The new syndicate is quietly buying up all the leading exchanges in the country.

FAYETTE BROWN, of this city, receiver of Brown, Bonnell & Co., Saturday made a statement in the United States Circuit Court of the business of the firm for the month of May, as follows: Balance as reported, $31,358.75; receipts in May, $185,057.08; total, $216,416.23. Disbursements in May, $179,250.49; balance, June 1st, $37,165.74.

MRS. A. BRAUKMAN, says the South Cleveland Advocate, has sold the patent right of her cold drawn steel shafting works, together with the real estate and machinery, to the Cleveland & Pittsburgh Railroad Company, but what they intend to do with the works, no person seems to know. Some say the Company intend to erect large machine shops in the neighborhood.

IT is said that the officers of the Standard Oil Co., such is the system to which they have reduced their gigantic business, know at noon each day exactly what have been their profits and losses the previous day. These reports are specially tabulated each day at their various works in Cleveland, Philadelphia, New York, etc., and telegraphed to the principal office.

MR. WM. CHISHOLM, of this city, said to a Chicago Tribune reporter the other day that the recent action of the Pittsburgh iron manufacturers was so inconsistent that he could not understand it. They had stated that they could not afford to manufacture iron and pay the prices the men demanded, and yet they had turned right around and acceded to the men's demands. They knew their business best, and all he could say was that he did not approve the way they had acted. In his own line they were running the mills and turning out steel cheaper than the English could sell it, but they were doing it without any profit. They men were kept employed, and they were about the only gainers.

CUYAHOGA FALLS.

BY A TRAVELING CORRESPONDENT OF THE TRADE REVIEW.

THE American Machine Co. are quite busy at present. Business is good, with orders increasing.

THE United States Machinery Co. have just shipped one of their bolt headers to the Grand Rapids & Indiana Railroad Co.

THE C. F. Harrison Co., manufacturers of boiler, bridge and tank rivets, are very busy, and report a good outlook for work the coming year.

SPERRY & RATTLE, manufacturers of "Best Vitrified Sewer Pipe," are running their works at Tallmadge and Cuyahoga Falls to their ut most capacity. They report business good with the outlook still favorable. They have but recently added to their works at the Falls a large new engine for increased facilities.

TURNER, VAUGHN & TAYLOR, proprietors of the Variety Iron Works, report a constantly increasing business, with a large demand for their sewer pipe presses and clay mills. They also manufacture grain and paper mill machinery, are employing 60 hands and running over time.

AKRON.

BY A TRAVELING CORRESPONDENT OF THE TRADE REVIEW.

THE Akron Strawboard Co. report business good, with large orders daily. They employ 80 hands and are making 15 tons of strawboard a day.

J. C. EWART & Co., manufacturers of roofing and drain tile, are very busy. They have just put in a new 100 horse power engine, made by the Webster, Camp & Lane Machine Co., Akron. They are shipping two to three carloads of tile every week.

THE Akron Steam Forge Co., manufacturers of wrought scrap hammered, car, truck and driving axles, also shafting and every description of forging used in railroad, machine and bridge works, are quite busy, putting in full time with a lap now and then.

THE Seiberling Milling Co.'s flour mill is expected to commence operations in October or November. E. P. Allis & Co., of Milwaukee, Wis., are building the mill. The mill has a capacity of 1,000 barrels per day, but will start off with making 600 barrels,. There is also some strong talk of their putting up an oatmeal mill next year.

THE Akron Business Men's Club Co. has now a membership of 36 and a good prospect of its being rapidly increased to its orginal number 40. There has also been some talk among its present members of its membership being extended to 50. The Club propose to erect one of the finest buildings of its kind; it will be four stories high, besides a basement. The first floor will be for the barber shop, bath-rooms and restaurant,and by the way it will be the restaurant of the city, so to speak. On the second floor will be reception rooms, and every day place for meetings of business men. On the third floor will be the Board of Trade room, dining room and private dining rooms. The fourth floor will be used for dances, large receptions, etc. The shares are held at $1,000 each, and members have the priviledge of paying for their stock in two, four or even ten years. After two years, they will pay 6 per cent., until their shares are paid up. The Club House will be erected at the corner of Main and Mill streets, opposite the new Grand Hotel.

OHIO IN GENERAL.

THE Girard furnace is producing over 100 tons Bessemer pig per day.

A. W. COATES & Co., Alliance are shipping 900 horse rakes per week.

HESS, SNYDER & Co., of Massillon, are making on an average 25 force-pumps per day.

THE Ohio Powder Works, Youngstown, are making about 240 kegs of powder per day.

THE men employed in the furnaces at Middlesex are out on a strike for an advance of 25 cents per day.

THE plate department of the New Philadelphia mill is idle owing to a breakage of the driving wheels.

THE new rolling mill at Toledo will be put in operation July 1. It is expected 2,000 men will be employed.

THE National Machinery Co., of Tiffin, have recently built three of their patent spike machines for the Central Pacific Railroad Co.

MR. E. W. GAYLORD has sold his interest in the Akron Manufacturing Co. to Mr. J. T. Trowbridge, and will remove to Cleveland.

THE Akron Cutlery Co. is being reorganized into a $30,000 stock company, most of which has already been taken by Akron capitalists, says the Sunday Gazette.

TWENTY-FIVE of the 35 blast furnaces in the Mahoning and Shenango Valleys are in operation, producing 2,000 tons of metal per day. —[Youngstown News-Register.

THE rolling mill of J. L. Edwards & Co., Canal Dover, has been sold at assignee's sale to the Reeves Bros,, Niles, for $14,000. It is probable that they will move the mill to Niles.

ALTHOUGH Messrs. Frey, Sheckler & Hoover, proprietors of the Eagle Machine Works, at Bucyrus, are able to turn out three of their patent brick and tile machines per week, they cannot keep pace with the orders which they receive. They are consequently about to enlarge their shops to twice the present capacity. —[Chicago Industrial World.

NUMBER 1, 3 and 4 mills of Brown, Bonnell & Co. are on double turn, and if orders continue to flow in, No. 2 will be started the coming week. The pay roll to-day amounted to $25,000, only a portion of the works having been in operation during the two weeks preceding this one. The reorganization scheme is progressing rapidly.—| Youngstown News-Register.

THE Ironton Register is the authority for the statement that on July 3, 1882, the Belfont furnace was "banked up," and was kept in that condition for the purpose of making improvements to the plant until April 23, 1883, when it was opened and 20 feet of fire found in the stack. Nine months and 20 days had elapsed. On the 25th the blast was successfully put on.

THE Youngstown Steel Casting Company is at present idle, there being neither demand nor price offered for their products that would warrant them in running.—During their usual shut down this summer the William Anson Wood mower and reaper works contemplate enlarging their foundry in order to increase their capacity for production.—[Youngstown News-Register.

THE new Ward Mills at New Philadelphia, remarks the Chicago Journal of Commerce, are now in active running order. The cost of these works when fully completed will be in the neighborhood of $150,000, and when in full operation give employment directly to 350 men. The dimensions of the main building are 355x125 feet wide; in this are situated the puddling furnaces, engines, roller trains, etc., with an adjoining similar building 125x125 feet, containing the steam boilers, sheet mill furnaces and roller trains. These structures are of the most substantial character and contain about 150 tons of iron, 2,000 tons of stone and a very large quantity of fire brick. Practically the buildings are fire proof. Two immense steam engines of 200 horse power each supply the motive power. The works are run on merchant bar iron and sheet iron of all kinds and dimensions. Mr. Ward's enterprise has been ably seconded by the citizens of the town who contributed 20 acres of ground and $40,000 in cash towards the work, so that the entire enterprise is valued at about $200,000. Combined with the Ward Iron Mills and Russian Mill (sheet iron) at Niles, O., they form a very extensive concern.

FEATURES OF THE EXPOSITION.

The Vacuum and Air Cushion Buffer.

SPECIAL CORRESPONDENCE OF THE TRADE REVIEW.

CHICAGO, June 18.—Among the exhibits at the National Exposition of Railway Appliances, which attracts a great deal of attention, is a buffer patented by John T. Schaffer. of Rochester, N. Y. It is an entirely new thing and no doubt it will be adopted by the leading railroad companies of the country. The buffer is to be used on passenger and freight cars, combining an air cushion and vacuum, giving an elasticity and indestructibility never attained by any of the old methods. Its construction is simply a plain cylinder and piston,and when placed on the ordinary draw car, in place of springs is equally applicable to both passenger coaches and freight cars. Owing to its cheapness and durable character compared with costly springs now in use, and the great loss, and damage done from their breakage, there is no doubt but this Vacuum and Air Cushion Buffer will meet ready endorsement and favor with railway officials in general throughout the country. It relieves cars that are using these buffers from the vibration of sudden jerks in starting, and the concussion of bumping when backing, or

[Continued on Page 9.

Recent Ohio Patents.

A BOILER FLUE cleaner has been invented by Rudolph P. Gerlach, Cleveland. The shank and head are in one piece. A flattened wide spiral uninterrupted steam-passage extends from the induction end of the implement through to the eduction end thereof.

HARRY MOORE claims to be the patentee of a paint that will not burn, and says if a bonfire is built at the side of a frame house painted with his paint, it will not burn the building. We dipped a piece of paper into his preparation, and tried several times to light it but did not succeed.—[South Cleveland Advocate.

IN a car-wheel invented by Jno. R. Morgan, Alliance, the body portion has recesses formed in its rim opposite the ends of the spokes, and is provided with outwardly-projecting lugs on opposite edges of its rim. The tire is furnished with lugs that fit between those on the body. Wooden cushions are secured between the tire and the body and within the recesses in the rim of the body portion of the wheel.

AN earth-scraper has been patented by William Haslup, Sidney. A reach swiveled at one end to the oscillating crank-axle of the scraper is secured at its other end to the rear of the scraper. A tilting lever pivoted to said reach gears with the crank-axle. The tilting lever is held in adjustment by means of an oscillating arm having a hook and engaging the front of the scraper. The oscillating crank-axle is mounted in ears on the side of the scraper.

A NEW and improved station indicator has been patented by Mr. Henry Koehler, of Pomeroy. This improvement consists in a band having the names of the various stations indicated upon it. The band is arranged to wind over two rollers, one of which is provided with a crank by which the attendant rotates the band and exposes to view the name of the station at which the train is stopping. A gong is sounded at the same time to call the attention of the passengers to the indicator. Separate edge strips may be provided on the same rollers for showing the distance the train has run from a given place, the time it was due, etc.

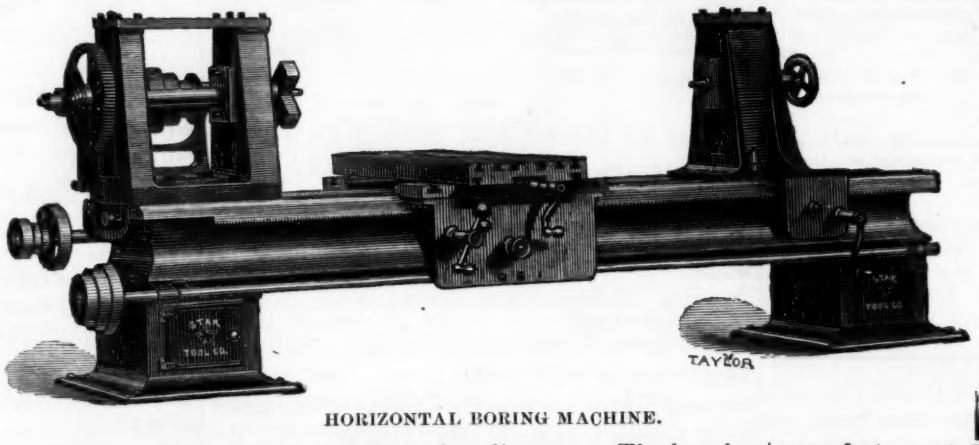
A VERY simple device to be applied to a harvesting wagon for stacking straw has been patented by Mr. Christopher Leffingwell, of Clarksburg. The wagon is provided with a stacker made in two parts hinged together at their adjacent ends, so that when the stacker is to be brought into use it may be readily extended and placed in position, and there supported by chains and guy ropes. The stacker may be so made to extend to any desired length, and when not in use it is folded into small compass for transferring from one field to another, and for convenient housing after the harvesting season is over.

A CASH-CARRIER has been invented by Allen W. Bodill, Canton. The rails consist of strips secured together to form a T-shaped joint. The elevator-box, which slides on vertical guide-rods, has a lower compartment with inclined springs on its inner bottom and a pivoted tilting till with an upright guard and cushion on its rear and a lip on its front end. A stop is located beneath the till. A trigger over the way connects by a rod with a latch engaging a stop on a tilting section of the way. A platform beneath the way and adjacent to the tilting section has a pivoted gate operated by a cord which passes over pulleys and operates the elevator. The lip of the till engages a branch of the upper way. The ways are suspended by wires whose lower ends are attached to keys on bearings. The carriers consist of hollow hemispheres coated with an elastic material and containing spring-actuated disks and plates held in place by a flange.

SPECIMEN copies of the TRADE REVIEW sent free on application.

Horizontal Boring Machine.

The accompanying cut represents a horizontal boring machine recently completed, and is designed for boring cylinders and work of a similar character. It is intended to take the place of a lathe, which is inadequate, although so commonly used for the purpose, and to which it is immeasurably superior, as all the trouble and perplexity of blocking the work upon the carriage to bring it properly in line with the centres are avoided; not only is time saved, but far better results in quantity and quality of work produced are obtained. The table upon which the work is placed has an automatic feed. The boring bar is brought to the required position by raising or lowering the centers of the machine, which is done accurately and simultaneously by suitable gearing and screws. The head spindle has large long bearings, running in composition boxes, and at its highest point will swing 46 inches over the bed and 33 inches over the table, and is driven by a cone with four sections for a 3-inch belt, and in connection with the back gearing has a range of speeds adapting it to turning or boring from ¾



HORIZONTAL BORING MACHINE.

of an inch to 33 inches diameter. The housing for the head and foot spindles is very substantial, mounted on a heavy strong bed supported by cupboard legs. A large face-plate and suitable tool rest are furnished when required, so that the machine can be used for turning; also a number of purposes to good advantage other than those for which it is specially designed. It is made by the Star Tool Co., of Providence, R. I., who will furnish any additional information if desired.

Drop Forging of Tool Steel.

In the ordinary forging of iron the element of time is an important factor—the material is gradually and by successive blows brought in shape, the anvil work being being supplemented by successive reheatings. In drop forging, although the final result is the same, the operations, which in common forging require time, are compressed into an instant, a single blow, or at most two or three, serving instead of the long continued hammering of ordinary anvil work. To effect these changes so suddenly the iron must be very pliant and plastic by high heating, approaching that of the welding process. For this reason it has not, until recently, been believed that cast steel—tool steel requiring the retention of all itsqualities of being hardened and receiving temper—could be successfully worked under the drop hammer. But this is now done as readily as the working of the toughest and softest of Swedish iron. By means of adjustable drops, which allows of blows from varying heights, the steel may be wrought precisely as though under the hand and trip hammer, without injury to it from overheating.

Cast steel partakes, undoubtedly, of that quality of iron known as "flowing;" that is, the metal may be pressed into forms without destroying or impairing the continuity of its fibers, merely changing their direction to conform to the outlines of the new shape. Usually this "flowing" of the metal is produced by compression—quick compression, but not a sudden blow—the metal, while plastic from heat, being forced into a mould or die. But the steel can be worked in a similar manner under a drop. Lathe-turning tools, caliper gauges, and many other small implements requiring hardening and tempering are now made from tool steel by being struck up in dies under the drop-hammer.—[Scientific American.

Construction.

[Under this head the TRADE REVIEW proposes to summarize various large contracts to be let within easy range of Cleveland, to the end that its advertisers, both at home and abroad, may be informed and be thus enabled to put in bids for different parts of the work in which they may be interested. If purchasing agents of railroads and of other large corporations will forward their invitations for proposals, the REVIEW will put them in shape and publish the same gratuitously. Mention the TRADE REVIEW in writing to parties for further information.]

APPLETON, WIS., is having water-works at a cost of about $150,000.

Cuyahoga Falls has a new wagon factory. The projectors are Vogan & Trym.

THE Y. M. C. A. building soon to be erected in Grand Rapids, Mich., will cost $40,000.

THE New Castle, Pa., City Council is preparing to adopt an extensive system of sewerage.

THE Ætna Machine Works, of Warren, O., are building a foundry and wood shop 50x100, one story.

REEVES BROTHERS having offered to build bridge works in Niles, on condition that grounds for the works be given, the offer has been accepted, and the money raised to pay for a suitable site for the shops.

CAPTAIN ALVA BRADLEY has purchased a lot of land in Bank street North of Johnson street, adjoining Morgan, Root & Co.'s property, and is going to erect immediately one of the finest blocks in Cleveland.

MR. JOHN DANNER, the revolving bookcase manufacturer, is erecting two buildings, one three story, 22x48, and one two story 24x82 feet, on his ground adjoining his manufactory at Walnut and Tenth streets.—[Canton Repository.

CITY Civil Engineer Morse, of Cleveland, will receive proposals as follows: July 5, for East Madison avenue sewer; July 7, for sewer in Euclid avenue between Giddings brook and Fairmount street; July 10, for sewer in Water street between Main and Superior.

BUILDERS and machinists will be interested in the following recent fires: Warehouse and portion of main building of the Crescent Iron Works, Pomeroy, O., loss $3,000, insured; M. Thompson's saw and flour mill, Marysville, O.; James A. Weaver's furniture factory and J. Y. Chapman's planing mill and hoop factory, East Saginaw, Mich.

RECENT Ohio incorporations, with capital stock: Buckeye Brown Manufacturing Co., Cleveland, $20,000; Middletown Paper Co., Middletown, $100,000; Zanesville, McConnellsville & Pomeroy Railway Co., $100,000; Stella Grate Co., Cincinnati, $10,000; Dayton Bridge Co., Dayton. $50,000; Cleveland Electric Co., Cleveland, $100,000; Youngstown Car Manufacturing Co., Youngstown, $100,000.

A proposed flour mill in Minneapolis will have a capacity nearly double that of the largest of the great mills now in operation, and to be able to grind 8,000 barrels of flour per day. "The magnitude of the proposed mill," says a Minneapolis newspaper, "will appear by considering that the building will have to be as much as 250 feet square and six stories high, besides a storage elevator with room for 500,000 bushels of wheat. It will turn out 5½ barrels of flour per minute, 333 barrels per hour, 8,000 barrels per day, 2,400,000 per year (300 days). It will require 10,000,000 bushels of wheat per year to supply it, and the value of its annual product will be at least $14,000,000.

THE total number of glass-making establishments in the census year in the United States was 211, with a total capital invested of $19,844,699, and the total value of the products was $21,154,571. In 1870 there were only 174 establishments, the increase during the ten years being 37 per cent., in employes 57 per cent., in capital invested 44 per cent., in wages paid 20 per cent., in material used 36 per cent., and in value of product 15 per cent.

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To Machinists, Manufacturers and Others.

THE publishers of the TRADE REVIEW solicit items of information concerning manufacturing and other establishments in any part of the country, and all such items will be promptly inserted in these columns, free of charge. Facts are the only things needed; and all communications should be accompanied with the name of the contributor—not for publication—but as a guarantee of good faith.

Manufacturers, machinists and engineers are particularly requested to communicate any matters of interest relating to their specialties. No one need be deterred from sending any interesting facts in his own language, as all such contributions will be properly revised before sending to press.

☞ When writing to any of our advertisers, please say that you saw their advertisement in the Cleveland TRADE REVIEW.

Northwestern Agent.—H. M. Brownell, 410 Nicollet Ave., Minneapolis, Min.

THE RAILROADS AND IRON.

In the course of an article on what it claims to be the beneficial results of railroad discrimination in times of iron trade depression, when but for the help of railroads iron-making establishments would have to shut down, the *Railroad Gazette* says:

> Whenever, then, any industry gets to the point where it must reduce its expenditures or close, the railroad, if it understands the situation, is sure to come to its relief, in its own interest. If the factory closes it will lose all profit from its business and considerable more. It accepts the less evil, makes any rate over cost which will permit the industry to continue to produce, and gets at least the profit from the incidental business. In this case supply and demand have just as much effect on this particular part of transportation as on the prices of ore, coal, etc. About January, 1880, Lake Superior ore was contracted, we believe, at $12 or $13 a ton, to be delivered in Cleveland the next season. This was fully twice as much, we suppose, as the ore was sold for at certain times after 1873, or as it may be sold for again, if the furnaces cannot make iron with ore at a higher price. Whatever the precise figures, the owners of the mines will not cease to send ore to market so long as there is any profit after paying the expenses of mining. But they have not so much reason as the carriers for such reductions, for they may hold their ore for a better time, while transportation is the most perishable of merchandise: to-day's train capacity must be used to-day or never; and the mine has not the profit that comes to the railroad from subsidiary transportation.

The point is probably well taken, within limitations, but the *Gazette* is somewhat at sea in its figures. The highest average price for which Republic iron ore has been contracted on the docks at Cleveland was $12.50 per ton in 1873. In 1874 it dropped to $8.75; in 1875, to $7.50; in 1876–7–8, it reached $7.00, and in 1879–80–81–82 it averaged $10.00. It will thus be seen that instead of being twice as high in 1880 as during the dull period after 1873, it was scarcely a third higher. The *Gazette* continues:

> On this account it is proper that railroads which are largely supported by the iron industries should pursue a conservative course. They cannot count upon such uniformity in the course of their business—especially in their profits—as the average railroad. Such a line as the Marquette, Houghton & Ontonagon, for instance, which lives on iron ore, might have its profits enormously reduced by such circumstances as would compel a great reduction in the price of iron. The roads about Pittsburgh, Cleveland and in the Hocking Valley would also suffer greatly under such circumstances. To be safe they should have comparatively light fixed charges, and count on paying large dividends in prosperous times.

Undoubtedly this is true, but will the *Gazette* tell us just where to draw the line on discriminations?

IRON-MAKING IN THE SOUTH.

A couple of weeks since, the TRADE REVIEW gave from excellent authority the estimated cost of making iron in the South, particularly about Birmingham, Ala. Our figures, to the ton of iron, were as follows:

2 tons of ore @ 70c	$1.40
1¼ tons of coke @ $3.60	4.50
¾ tons limestone @ 90c	.67½
Labor	3 25
Wear and tear	1.00
Total	$10.82½

That this is really above the average is, we believe, easily demonstrable, but let it stand at that. The Baltimore *Manufacturers' Record*, we observe, has also been pursuing the subject, having received replies and estimates from five firms. These are of so much interest that we quote quite liberally from them. The Callie Furnace (State not given) gives the following from actual practice:

Coke, 3,432 lbs. @$4.50	$6.89
Ore, 6,049 lb-. unwashed@60	1.62
Limestone, 3,839 lbs.@60	1.03
Labor	2.54
Incidentals	1.00
	$13.08

From the Powells Fort Mining Co.'s Mine Run Furnace, Shenandoah County, Va., comes this estimate:

Ore, 7 tons, @$1 50	$10.50
Charcoal, 500 bushels, 4½ cts	22.50
Limestone, 3 tons, 40 cts	1.20
Wages	13.25
Total	$47.45

Or $13.56 per ton.

It is to be remarked that this is a small furnace, running with water power, and turning out only 3½ tons per day. Enlarging the stack so as to give a capacity of 12 tons per day, the owners estimate that they could reduce the cost to $12.62 per ton. More elaborate are the figures given by a correspondent writing from Polk County, Ga., which we append:

175 bushels charcoal @ 5½ cts		$9.62
2½ tons 50 per cent. ore @ 50 cts		1.25
Hauling 2½ tons ore @ 20 cts		50
Roasting 2½ tons ore @ 20 cts		50
1-3 ton lime rock @$1.50		30
Superintendent per day	$5.00	
2 keepers, $1.50 per day	3.00	
2 helpers, $1 per day	2.00	
2 extra men, $1 per day	2.00	
2 engine men, $1.50 and $1.25	2.75	
4 fillers, $1 per day	4.00	
4 ore screeners and pounders	4.00	
1 watchman	1.00	
Labor	$23.75	
Average capacity 10 tons		2.37½
Rent 1-14 product; nominal $16 cost		1.14⅜
Repairs and incidentals		81
		$16.50

Still lower estimates are given by the Bear Mountain Iron Co., as follows:

Say 1¾ tons ore @$1.00	$1.75
140 bus. charcoal @4 cts	5.60
Lime	10
Labor	2.75
	$10.20

Finally we have the estimate of the Longdale Iron Co., of Allegany County, Va., that iron can be made now in various localities in Virginia at from $11 to $13 per ton, but that they do not believe this can remain true for a very long period. Of course these figures could scarcely be expected to be *lower* than actual practice, and we doubt not they in reality go above it. At any rate they afford valuable material for study, and we shall look with interest for further developments.

AESTHETIC MACHINERY.

The aesthetic decorator of machinery is abroad in the land. Paint-pot and brush in hand, with a head full of sunflowers, lilies, and Queen Anne conceits, he goes forth to conquer, and a line of ruined machinery marks the course of his travels. Just what necessity exists for daubing the bright surface of the finished iron, steel or brass with green paint, and profusely distributing Oscar Wilde-ian designs upon every exposed point, is a mystery which has not yet been explained; but the aesthetic decorator must earn his daily bread, and so long as there exist susceptible engineers, with more pride than good taste, this wholesale defacement of machinery will continue. We have in mind a couple of massive pumps not a thousand miles from Cleveland, which have thus been ruined so far as anything pleasing to the eye is concerned. They are splendid specimens of modern mechanical engineering skill, and in the condition in which they left the shops would inspire admiration in a high degree. But the aesthetic decorator was let loose upon them, and behold the result! Upon a gaudy green background has been dashed a bewildering profusion of bright yellow and red curves, circles, embroidery, "scallops," lilies, sunflowers, etc., the effect of which is simply sickening. On a country wagon it might do; on such machinery it is diabolical. It is as if some crazed aesthete should attempt to "decorate" the face of the Adirondacks. The whole effect is spoiled, and from a natural admiration at first awakened by the splendid outlines of the machinery one turns in disgust at a sight of its senseless decoration. It is to be sincerely trusted that this sort of thing has gone as far as it will ever go. It lowers the dignity of the engineering profession and brings true art into contempt and ridicule. The best machinery needs little, if any, decoration. Its true lustre comes from the bright, well kept surfaces of the original material which goes to make up its massive and graceful proportions.

PRACTICAL PAPERS.

We have no apology to offer this week for devoting so much space to the proceedings of the Cleveland Meeting of the American Society of Mechanical Engineers. The different papers presented were so varied that the publication of synopses in effect gives to the present issue fully as much variety as usual. The Cleveland meeting will long be remembered for its harmonious proceedings and the liberal provision made for the comfort and instruction of the visiting members. There were no factions to clash and no fisticuffs between members of the local committee that we have heard of. "Excursion Day," Thursday, was full of surprises for the visitors, who departed with a high opinion of the extensive manufacturing interests of Cleveland. So complete and well-timed were the arrangements that not a single hitch occurred during the entire circuit of the city. All in all, we doubt if a more pleasant and profitable annual gathering goes upon record in 1883.

TRAFFIC on the Valley Railway is growing enormously. All the side-tracks between Cleveland and Akron seem to be full of loaded coal and freight cars. One hundred and forty carloads of coal were laid down at the company's docks in this city last Saturday. At this rate double tracks as far south as Akron will soon be a necessity.

THE Ohio National Bank, of this city, has decided to accept oil certificates as collateral security. This virtually puts the Cleveland Oil Exchange on its feet, as the other banks will no doubt follow.

THE coke producers of the Connellsville region have combined to close down one-third of their ovens. Owing to over-production, they have been selling at a sacrifice.

AND now a $15,000,000 syndicate is reported to have arisen at Oil City to boom oil to $1.50. Look out for dead ducks.

GIVE the TRADE REVIEW a trial.

AMERICAN MECHANICAL ENGINEERS.

THE SOCIETY'S PLEASANT AND PROFITABLE CLEVELAND MEETING.

Synopses of the Various Valuable Papers Read by Members.

So much of interest and practical value transpired at the meeting of the American Society of Mechanical Engineers in Cleveland last week that it is extremely difficult to choose what is best to print in a condensed report of the proceedings. A number of papers in our possession are of such general interest that nothing short of publication in full will do either them or our readers full justice. Accordingly we simply refer to them in this report and shall publish them in full hereafter.

At the opening session, Tuesday evening, three papers were read. That of Mr. J. F. Holloway, of Cleveland, on "The Marine Engines on the Lakes, and a Device for Getting Them off the Dead-Center," we published in full last week. The second paper was on—

ECONOMY IN LUBRICATION OF MACHINERY.

BY GEO. N. COMLY, EDGEMOOR, WILMINGTON, DEL.

In large manufacturing establishments the sum of money paid annually for lubricants is surprisingly great, and where oil is the lubricant the quantity wasted is a very large percentage of the total amount purchased. Being convinced that such was the case, I endeavored to ascertain the actual quantity of lubricating material used in a given time on the various machines and in the various shops connected with the establishment at which I am engaged. The result was startling, and the investigation proved that one of the most extravagant users of oil was the vertical engine used for driving the principal part of the works used for machine shop and bridge construction, etc. The engine was nominally 60 horse-power, with 16-inch cylinder and 18-inch stroke, with an 84-inch diameter pulley, making 106 revolutions per minute, but the indicator cards were evidence of the fact that frequently 83 horse-power was produced by the engine. Owing to the fact that the engine was overloaded, the crank-shaft bearings and crank pin gave much trouble by heating, and occasionally it was necessary to stop the engine during working hours.

The expense for lubricating oils on this engine during the month of May, 1882, was at the rate of 3 53-100 cents per hour of the time during which the engine was actually running. The oil used was cosmo-lubric No. 2,costing 65 cents per gallon, and the specific gravity of the oil was 26 deg., Beaume. During June the oil cost 391-100 cents per hour run,and the engine was running 120 hours per week, or an average of 20 hours per day. About the 1st of July I commenced using No. 10 lubricine-grease on the crank shaft bearings instead of oil, and the result was that the engine shaft bearings worked much cooler, gave no more trouble, and the cost of the lubricating material was reduced to 1 15-100 cents per hour run. The crank pin at this time was still using oil, and continued so doing until October 9th, when I had a copper box attached to the stub-end of the connecting rod close to the crank pin with a ½ inch tube connecting the box with the crank pin bearing, and No. 4 lubricine-grease packed in it. No. 10 lubricine was also applied to the guides for the crosshead, the result being that the cost of lubrication was still further reduced to 78-100 of 1 cent per hour run, and the guides and pin worked much cooler than they did previously when oil was used. A mixture of palm-grease and beeswax in proper proportions will compare favorably in efficiency to the lubricine-grease. I have also found mixtures of beeswax and tallow or beeswax and suet to work very well as lubricants for shafting. The relative proportions must of course be made to suit circumstances.

During the past eight mounths the line shafting has been running without oil, depending exclusively on the mixtures such as already described. The shafting is all provided with ball and socket hanger boxes, and the top half of the box has two cups cast in it in which the grease is packed, each having a cast iron cover fitting closely over it to keep out the dust. This cover is chained fast by a very light chain to prevent it from being lost or knocked down by ladders, etc. The center oil hole, where a self oiler is usually placed, should be stopped up with a cork to keep out dust at that point, and the use of oil is not allowed on any of the shaft bearings where the grease can be applied. By the regulations already described the cost of lubricants has been reduced 44 6-10 per cent. in the cases noted above. Means have been provided for using the grease on nearly all of the engines running at the works and on several of the heavy machines, the result being a saving of lubricant and cool running of the journals.

It is better when applying the grease to make large holes in the caps of the bearings (perhaps 1¼ or 1½ inches diameter if allowable) and permit the grease to be packed directly on the journal surface. Where this cannot be done, a funnel shaped cup is attached to the oil hole, in which is a capper rod, one end of which presses against the shaft while the other end passes through a spiral spring which is tightened to the required tension by a screwed cap. The cup is filled with the grease, and the rod passing through it melts the grease by the heat caused by the friction of the copper rod on the journal, the spring being tightened sufficiently to produce the necessary friction on the end of the rod. Plain copper boxes, however, are frequently preferable with lids to keep out dust. A piece of copper rod run through the center of the box touches the shaft, and the hole between box and shaft is made much larger than the size of the rod of copper, so that the grease can be well pushed down on to the shaft.

In the discussion which followed, Mr. C. J. N. Woodbury, of Boston, took issue with the main point of the paper and gave the result of experiments made by him in a Fall River mill, going to show that oil showed a much greater reduction of heat in shafting than grease, the wear on machinery more than counterbalancing the increased cost of oil.

The third paper was read by Secretary Hutton in the absence of the author. It was entitled—

HISTORY AND DEVELOPMENT OF WINDING AND PUMPING MACHINERY IN THE ANTHRACITE COAL REGIONS OF PENNSYLVANIA.

BY HOWELL GREEN, JEANESVILLE, PA.

[Condensed.]

The anthracite coal beds of Pennsylvania—(some 15 in number), classified by the color of the ash—may be divided into four divisions. The uppermost group is red ash; second, gray ash; third, white ash; and the fourth, or lowest group, is, again, red ash. This color of the ashes might seem more of a chemical than a mechanical question, but as it is a tolerably sure criterion of the condition of the water in the mine, as well as of the burning properties of the coal, it was early noticed. These beds of coal lie at every possible inclination to the horizon, dipping under the surface over 2,000 feet (say 1,000 feet below the level of the sea), and running up mountains hundreds of feet above the beds of adjacent streams. The first coal was mined where it was most easily got at, so that in the earlier days of the trade (which commenced about 1820), only drifts or tunnels above water-level, and strippings near the surface, were used to get the coal. Soon the requirements of the market made it necessary to go into the depths of the earth for coal, and means had to be provided to hoist the same, and to keep the mine clear of water. The soil in the coal region is poor, and before mining commenced population was sparse, and a few inhabitants combined hunting, fishing, farming, and lumbering in about equal proportions for a livelihood. * * *

Very early in the progress of mining below water-level it was seen that means had to be provided to hoist from 300 to 400 feet at one lift, so as to get space for breasts, to work the coal profitably; and the quantity of water to raised was found to run into hundreds of gallons per minute. From the first, both slopes and shafts were used. The mine cars in the anthracite regions have always been large, starting in the early days at about 40 cubic feet capacity, and standing now at about 96 feet. The wheels of the cars have been from 12 to 20 inches diameter; 18 inches is now most generally used. The axles have been from 2 to 2¾ inches diameter. The gauge of the mine rail roads varies from 30 inches to 48 inches; in a few cases it is 4 feet 8½ inches. At first chains were used for hoisting, and some of the early shafts had hemp ropes. Flat chains, or, rather, three chains side by side, with alternate large and small links, and with blocks of wood through the large link, were tried. These flat chains were wound on flanged spools like a ribbon. Iron and steel bands were used, but the conclusion of the greatest number now is to use iron-wire round ropes.

The first steam engines used for hoisting anthracite coal and pumping the water (and at first they combined both duties) were single high-pressure engines, with flat bed-plates bolted on wood frames. The pump was, of course, near the bottom of the mine, perhaps 400 feet away. It was a lifting pump, 16 inches bore, 7 feet stroke, fitted with a bucket faced with sole leather, the rod of which went through a stuffing box in a goose neck, or turn-piece. The valve gear of this engine consisted of two eccentrics and rods with hooks on the ends, which the engine man lifted in and out of gear with his feet, thus leaving his hands free for full control of the slide-valve which he operated with a long bar. He regulated the quantity of steam for the engine by a throttle of the stove-pipe-damper pattern. Thirty years ago such a pumping and hoisting engine was considered first-class, and many of the old fellows are yet at work.

This state of affairs was much improved by putting up another engine, so that one engine could pump, and the other one could hoist. Next it was discovered that two engines could be attached to the same shaft, at right angles to each other, so that no fly-wheel would be wanted. It was found that hoisting and pumping engines in which cogwheels were used were subject to noise and break-downs, and as the miners went deeper it was found that drums keyed immediately on the crank shaft of a double engine did the best. This change, of course, involved larger steam cylinders, and in the place of wood-faced drums cast iron ones were made, which soon led to the use of spiral grooves to keep the ropes from chafing. Still further, these drums were made conical, so that when the heavy load was to be started the small end of the cone did the pulling, whilst the empty car (and cage, if in a shaft) pulled by the large end of the cone on the other side. This arrangement is the best yet tried—and so the hoisting engines stand today. These are strongly built double engines on strong stone foundations, with steam cylinders from 20 to 40 inches diameter and stroke from 4 to 6 feet. There are heavy wrought iron shafts, spiral-grooved cast iron conical drums, steam brakes and steam reversing gear,with appliances to prevent overwinding, with safety catches and detaching gear; and, barring waste of steam, the world can show no better hoisting engines than are in the anthracite coal regions of Pennsylvania.

Perhaps the most discouraging situation for a mechanical engineer to be called to in the anthracite coal regions, is to have to provide the remedy for an old drowning mine, where the vein is large, the pitch steep, the top bad, the mine full of fire-damp, the timbers old and rotten, and the water so full of acid that it will eat up a shovel in a night, with the air so close that one can hardly breathe. The first mining pumps used were of the Cornish pattern—the old drawing lift with an iron bucket faced with leather. This leather was held in place by a wrought iron or brass ring which nearly fitted the working barrel, and was driven full of wooden pegs. If the working barrel was made of hard iron and the length of the rod nicely adjusted so that the leather would come slightly above the bore in the up stroke, and if the water was clean and not acid, and the lift not too heavy—then, this is still the best mining pump ever made. Open top force pumps were made, hoping that they could be lubricated and made to stand, but the general conclusion ar-

rived at, about the year 1848, was, that plunger pumps must be tried. Since that time they have been generally used, and the reason of their longer life is that plungers can be lubricated and the corroding action of the acid water lessened. At the first lifting pumps were worked by rods running up to the engine, quite a change in balance boxes occurred when lifting pumps were changed to plungers. and about this time quite a number of double-acting pumps were put in. These pumps, of course, discharged water at each pass of the piston, and had four valves instead of two. About the years 1854 or '55, the Bull engine and pump were introduced. These did away with cog-wheels for pumping, as the pump rods were fastened to the piston rod of the steam engine. No fly-wheel or crank were necessary on these engines, since the cylinder was made large enough to lift the rods which were made heavy enough to force up the water on their downward stroke.

About the year 1860, steam pumps began to be used in the coal mines, the great departure being in bringing the engine and pump together; and from the unfortunate nature of the case, the engine had to be taken down in the mine 500 to 1,000 feet from the boilers. Here commenced another trouble, which is the great loss of the power of the steam so conveyed. Strange as it may seem, the old war between acid water and pistons rods had to be fought over again, and the acid water came out ahead with steam pumps, just as it did with lifting pumps.

As the pumps now stand in the anthracite coal regions, those which use the least fuel are the old plungers, worked by engines on the surface, using cog-wheels and pinions. Next in point of economy are the Bull pumps. Then follow various kinds of steam pumps—good, bad, and indifferent. None use the principle of expansion to a very great degree, and the duty done by 100 lbs. of coal may be stated at from 10,000,000 to 20,000,000 pounds of water raised one foot high.

The pumping of the water of the anthracite mines is an ever-increasing trouble. The mine widens, the out-crops fall in, and as the quantity of coal to be had decreases, the water increases. For this state of affairs there is no help. Some colliers in the middle coal field use, at certain seasons of the year, 100 tons of coal per day for pumping water, to raise 8,000,000 of gallons in 24 hours, from a depth of 400 feet. And so the situation is. The question that today troubles the minds of many engineers in the coal regions is, how had we best build our mine pumps—shall we stick to the old method of a plain steam pump, with no expansion or condensation, because it is so handy to put in and take out? So far as the pump alone is concerned, the answer seems, yes; but when we see the long row of boilers, and immense piles of fuel for them, it calls attention to the other side of the question. If by this imperfect sketch, the writer shall have called the attention of this society to this difficult and important question, he will be satisfied.

At Wednesday morning's session, Mr. W. F. Durfee, Bridgeport, Conn., by the aid of some handsome drawings, explained the construction of the vertical engine manufactured by him. We append a synopsis:

BALANCED VERTICAL ENGINES.

BY W. F. DURFEE, BRIDGEPORT, CONN.

His first engine had been erected in 1869 for driving twelve-inch rollers. The diameter of cylinder and stroke of piston are twenty inches, the bed plate is six feet square and strengthened by a number of rails. The construction of this bed plate and its bearings was given in detail, as were also the other parts of the engine. The frame of the engine is secured to the bed plate by nuts and holding-down bolts. The steam cylinder is of the character of those in the majority of tug engines. His mode of preventing water from running over the connecting rods and other parts of the machine is by having drain pipes, and the packing so arranged that the water not receiving any pressure from above, does not find its way through the packing, but remains in the packing gland. A balance, which he was using on the engine to overcome the steam pressure, he recommended from his personal experience. A try-cock in the middle of the steam chest column, would allow of a test as to the amount on hand. The stuffing box he had used was one seldom made and used, but one which he had found very satisfactory; plane sides, the top being the cylindrical head, and the bottom the packing box. Steam is conducted to this by a one and one-fourth inch pipe from the main steam-pipe between the throttle valves. Everything above the small cylinder is expelled at the first stroke. The engines he described ran silent and with no trouble to any one; had much less frictional resistance; occupied less space; capable of higher speed than a high pressure engine, and the foundation is less in cost and size.

The discussion following brought out some criticisms as to Mr. Durfee's claim that vertical engines were capable of the highest speed. The friends of the horizontal engine claimed for it a piston speed record superior to that of the vertical. The next paper, read for the author by Mr. C. J. N. Woodbury, Boston, was on

BETON IN COMBINATION WITH IRON AS A BUILDING MATERIAL.

BY W. E. WARD, PORT CHESTER, N. Y.

The paper considered the uses of various materials of building and the want of some substance to prevent fires. He had turned his attention to the subject some years ago, and had developed the fact that if these two materials were properly joined together their safety was assured. Near Port Chester N. Y., he had erected a building which was composed of wood only in the windows, doors and sills, with some other minor parts. A photograph of the build- was on exhibition in the room and its perfect symmetry was apparent. A finely-crushed blue stone was found to be best in composition with the beton as a plaster, with sand and gravel. The process of manufacture was given in detail. The essential quality of elasticity was shown to be found in the compound. The beams were all molded in place on the floors and roof. The sections of floor and supports, which would come in contact, were covered with paper, to insure a chance for a movement during changes in temperature. Thirteen thousand square feet were composed to fill the requirements of the building. Long or short floors spans could be constructed, the substance being fully able to sustain great weight with a sufficiently strong iron rod for a support. The same material was thought to be all required for other works of engineering, such as the Hudson River Tunnel, where there is at present a chance of a settlement of the roof or floor. The speaker thought, too, that this material was the one for the foundation for the Statue of Liberty, in New York harbor, and other uses to which it could be put were mentioned, showing the wonderful usefulness of the composition. The mode of heating the house in question was by openings in the walls under the floors and thus through the house, 55,000 cubic feet of space being heated from one chamber, called the heating chamber, with a temperature of 170 deg. produced by 325 pounds of anthracite coal per day. Iron beams reinforced with beton could be made to sustain a larger with than without, and could be heated to white heat without any danger from fire. Health could be protected by the manner of allowing a free introduction of air in the walls. Theaters, public schools and all public buildings should be constructed of such a material as to prevent any possible accident from fires or falling walls, and this was thought to be the substance required.

Mr Capen read the next paper as follows:—

CRANES: A STUDY OF TYPES AND DETAILS.

BY AVERY R. TOWNE, STAMFORD, CONN.

The only English textbook on this subject, he said, was Glynn's, which treats of crane-building as it was practiced thirty years ago in Great Britain, and is now practically useless. Cranes are but little used or appreciated in America in comparison with Europe. The writer prepared a list of cranes which, he said, were clearly classified by reference to the modes of transferring their loads horizontally, and were divided into rotary cranes, in which the load was revolved around a fixed center, and rectilinear cranes, in which the load was moved in straight lines. These types were subdivided into two general classes as to their movement, fixed and movable cranes, and into three other general classes as to their motive power, viz.: hand power, steam and hydraulic. A further distinction is covered by the term locomotive, which is applied to cranes (usually of the rotary type) which are capable of propelling themselves on a roadway or track. Rotary cranes comprise the following principal types: swing cranes, jib cranes, column cranes, pillar cranes, derrick cranes, walking cranes, and locomotive cranes. Rectilinear cranes comprise the following principal types: bridge cranes, tram cranes, traveling cranes, gantries and notary bridge cranes. In the application of power the gearing of a machine can only modify the power applied, either by reducing the velocity and proportionately increasing its force or "pull" or by increasing the velocity and proportionately decreasing the intensity of the power transmitted. The smoothness and economy of power of the machine depend largely upon the manner in which the gearing is made. A second feature of prime importance in the hoisting gear of a crane is the mode of sustaining the load. The worm-wheel system is usually safe against accident, but is not economical of power; the spur-wheel system, on the other hand, is a constant and inevitable source of danger. The hoisting power of a crane should attain these results:

1. Such changes in direction and velocity of the power applied as will give the desired motions to the load.

2. The accomplishment of this with a minimum loss of power through friction.

3. The safety both of the operator and the load, under all conditions; to insure which the load must be always self-sustained and incapable of "running down."

4. Capacity for changes of speed and for convenient transition from one of these to another at will, whether the gearing is in motion or at rest, and for the automatic support of the load during the act of changing speeds. A perfect system of bridge propulsion must hold the bridge absolutely square with its tracks, and must propel the opposite ends of the bridge in the same direction, at the same time, and at the same speed, however unequally the load may be distributed. It is desirable also that, in large cranes at least, provision be made for starting the bridge slowly from a state of rest, and then increasing the speed, and also for varying the speed while the bridge is in motion.

Summing up the relative merits of chains and ropes, Mr Towne said:

Hemp Ropes—Admissable only for small cranes not in frequent use and not exposed to the weather or to heat.

Wire Ropes—Available under any ordinary conditions, but involving a winding barrel of large diameter and large sheaves; not economical of space.

Chains—Possessing, if well made, all advantages and the greatest durability; common chain requiring a winding drum, but permitting it and the sheaves to be of smaller diameter than with wire rope; pitch chain, dispensing with a drum and admitting of the use of a narrow chain wheel.

From his analysis he deduces the proposition that chains, if well made, constitute the best form of flexible cord for sustaining the load in a crane, and that a well constructed chain wheel (as contradistinguished from a winding barrel) is the best form of device for hauling in and paying out the chain; and, therefore, that the best method of crane construction involves the use of these two elements. Experience in the practical designing and building cranes of many types, convinces the writer that, by the proper use of materials, crane construction in iron costs, in most cases, little if any more than in wood.

Mr. T. R. Morgan, of Alliance, gave some interesting details in regard to a new type of traveling crane which he had lately perfected. He spoke with regard to the danger of using "worm" and "spur" gearing over each other, and thought the double flange was made simply as a safegaurd to prevent any danger, should there be any, which he doubted. Worm gear did not meet his approval for heavy work, a crane of thirty tons in his shop doing away with it altogether, and yet possessing all the essential points introduced into the preceding paper. In worm gearing the wire rope used

[Continued on Page 12.]

FEATURES OF THE EXPOSITION.

[Continued from Page 4.]

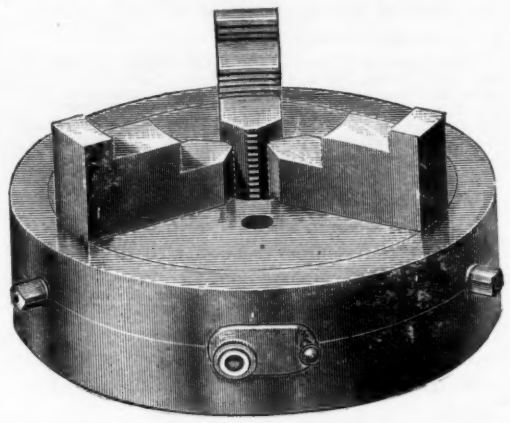
sudden stops. In conclusion I will say that it will be to the interest of all railway officials to see this vacuum and air buffer, and to test its working qualities, before the Exhibition is over. For further information address John T. Schaffer, Rochester, N. Y.

Goodwin's Patent Dump Car.

So much progress has been made of late years in the improvement of dump cars that one, to attract especial attention at the great Railway Exposition, must be of more than ordinary merit. Such an one is Goodwin's Patent Dump Car, patented by Mr. J. M. Goodwin, of Sharpsville, Pa., and manufactured by Milliken, Boyd & Co., Youngstown, O. The car now on exhibition was loaded with coal from the Sharpsville railroad, Mercer county, Pa., and transported in an ordinary freight train 507 miles in forty-four hours, and then unloaded and placed in the building. This car (a four-wheeled one) weighs 11,800 pounds. It is built in four-wheel or eight-wheel form, according to the character of the traffic to be accommodated. Its carrying capacity for ore or limestone is 24,000 pounds; for block coal 20,000 pounds, and for ordinary lump coal (bituminous), 16,000 pounds. Fitted with a "rack," two feet in height above present side-rail of car, the four-wheeled car carries 20,000 pounds of coke. The top of the side-rail is seven feet four inches above top of track rail. The eight-wheeled car is made the same height. Either car may be made about a foot lower if desired. The eight-wheeled (20 ton) car has "bulkhead" midway of body, and four falling valves instead of two, as in the four-wheeled form. In delivering material for raising track, and in "ballasting," small valves, working in the larger valves, are used to distribute the gravel, or other material, along between the track-rails. This car will dump its load of coke, coal, cinder, ore or limestone, as desired—all on either side of the railway track; or half on each side; or part between track-rails and part at either side. In ballasting the car will distribute all the material between the rails, or part between and part outside of rails. These operations are performed without any tipping or rocking the body of the car, and no manipulation of any "machinery" is necessary to effect any one of them—the simple act of releasing a "stop" is all that is required. In the act of dumping its load, the car occupies the same cross-section area as when loaded and running. If the car were to dump itself while running the load will be distributed alongside the railway without obstructing the track; but there is no tendency, it is claimed, in the car to dump itself. On the contrary the security against such an accident is said to be exceptionably perfect. Among the additional claims made for this car are that in dumping no part of the load is raised, the tendency is all downward; that the dumping is positive—may be effected by one movement of one part; that the car is simple in construction and costs no more for construction and maintenance than the ordinary gondola of equal capacity; that the load, if frozen solid, can be gotten out from beneath and loosened with comparative ease, and that it will effectively dump coke when the same has been loaded in racks or high boxes. To a TRADE REVIEW representative Mr. Goodwin made the following estimate of the saving possible in the country in one year by the use of this car: Furnace stock—ore, fuel, flux, and mill cinder—18,000,000 tons annually, and about 65,000,000 tons of coal exclusive of that used by the furnaces, making 83,000,000 tons annually that may be dumped. Of this probably 20,000,000 tons are now handled in bottom dump cars. The saving in dumping the 63,000,000 tons now shoveled, at 5 cents (a low estimate) per ton, would be $3,150,000.

The National Combination Chuck.

Among the many exhibitors at the Exposition of Railway Appliances, none made a finer display than Mr. S. A. Smith, manufacturers' agent, No. 154 Lake street, Chicago. Among his display is the National Chuck, manufactured at New Haven, Conn., concerning the merits of which we cannot say too much. We herewith represent the front view of the National Combination Chuck. The parts used in the construction of this chuck are the front and back sections of the shell, the jaws, the circular rack and pinion screws common to the Universal Chuck, and a loose ring having bevel plates attached lying under the rack. Recesses are made in the back section of the shell into which the bevel plates on the loose ring may fall when the rack is thrown out of gear with the pinion screws. When the rack is thus thrown out of gear each jaw moves independently; when it is in gear the movement is universal. A stud attached to the loose ring extends through an elongated slot in the shell of the chuck, and by this the ring is moved to and fro, thus instantly throwing the rack in or out of gear with the pinion screws. The plate which lies on the periphery of the chuck is made to swing on the stud, and above the plate is a thumb nut which when turned down holds the ring, by means of the plate—and a stop-slug which is attached to the plate and rests in the slot—firmly in position. In either position of the plate the slot is entirely covered, and the ingress of chips and dirt to the gear is prevented. It will be seen that the mechanism of the National Combination Chuck is very simple, and that the change from universal to independent and the reverse can be made instantly and effectively. To make the change from independent to universal action, move each jaw toward the center until their back ends are true with the fine line on the face of the chuck, unscrew the thumb nut as far as it will turn and loosen the plate, then by placing your thumb on the nut and the wrench on one of the pinion screws the slightest motion will suffice to throw the rack into gear with the pinions. Reverse the plate, let stop-lug drop into place, and turn the thumb nut down to place. The chuck will then be universal, perfectly true and ready for work.



NATIONAL COMBINATION CHUCK—FRONT VIEW.

This firm manufactures a new style four-jawed Independent Chuck. The jaws are so arranged that six separate sets of jaws can be made from the one set. Since the opening of the Exposition Mr. Smith has made several sales of the National Chuck to the leading railways and manufacturing companies of the West. Mr. Smith is also general agent for the Holbrook Patent Hide-Faced Hammers. These hammers are invaluable for machinists, workers in brass or silver, jewelry manufacturers, or for any one who needs to strike a hard blow without bruising the material he is at work upon. One pair of extra faces is sold with each hammer, and when worn out they can be renewed at slight cost, the old ones being easily removed by fastening the hammer in a vise and taking out the screw, when a few blows on the side of the face will usually knock it out. If worn down very much, a cold chisel may be necessary. The new face needs no fastening except tight-fitting shell. We recommend these hammers to the trade in general. In conclusion we will say to all parties who are in want of machinists' specialties to address S. A. Smith, Manufacturers' Agent, 154 Lake street, Chicago, Ill.

THE Northwestern Lumberman says few are aware, or even stop to think, how much lumber is used in car building. It is estimated that there are 400,000 cars in this country, and as 3,000 feet, in round numbers, are used in the construction of a car, it follows that the cars that are rolling around the country represent 1,200,000,000 feet of lumber.

CONDITION OF BLAST FURNACES.

Fifty-one per Cent. Out of Blast—16 per Cent. since January 1.

The number of furnaces in blast is reported by the Secretary of the American Iron and Steel Association to have been 351 on the 1st of June last, out of a total of 688 in the United States, against 417 out of 687 Jan. 1—a reduction of 66, or 16 per cent., within five months. Of these 66, 24 are anthracite, 18 bituminous and 24 charcoal furnaces, a reduction of 15 per cent. in anthracite, of 14.2 per cent. in bituminous, and of 18½ per cent. in charcoal furnaces. It should be remembered that there is always a large number of furnaces out of blast, and it is not so much the large proportion (51 per cent.) out of blast now that indicates the bad condition of the industry, as the large reduction since the beginning of the year, when already there had been a large reduction in the price of pig, but only 39.3 per cent of the furnaces were out of blast. And all these figures doubtless exaggerate the reduction of pig iron *production*. The furnaces blown out are usually those in which the cost of making pig is greatest, and these are chiefly the older and smaller ones, while the larger ones continue. The blast furnace statistics would be much more valuable were *capacity* given, as well as the numbers of furnaces. Some produce five times as much as others. The average production per furnace existing at the end of the year was but 6,727 long tons last year, an average of but 18.4 tons per day. Several furnaces will produce five times as much as this average, though not for 365 days in the year, probably.

Of the 66 furnaces that have blown out since Jan. 1, 22 are in Pennsylvania (which has 275 furnaces), and 21 in Ohio (which has but 93). Mr. Swank has made his report much more significant, however, by obtaining reports of the furnaces which are to be blown out soon. There are 5 of them in Ohio, 13 in Pennsylvania, and 27 in the whole United States. The Ohio furnaces seem to have felt the reduction of profits especially. There are now but 44 per cent. of them in blast, against 49 in the whole country and 59 in Pennsylvania. In the Hocking Valley only 4 out of 14 are in blast, in the Hanging Rock region 21 out of 38, in the Mahoning Valley 8 out of 18, elsewhere in the State 8 out of 23. In the States further West, where there are 81 furnaces, 32 are in blast; 8 have blown out, but 2 others have blown in since Jan. 1. The districts of considerable production where the largest proportions of furnaces are still in blast are Allegheny county, Pa., 87½ per cent.; the Lehigh Valley, 74½ per cent.; the Lower Susquehanna Valley, 72 per cent. In the two Virginias 33 out of 52 are out of blast; in the other Southern States 34 out of 67, or about the average of the country.

Eleven months before July 1, 1882, the Iron Age reported 434 out of 741 furnaces in blast, or 58½ per cent. of the whole number. It will be noticed that this is 54 more furnaces than the Secretary of the Iron and Steel Association found in existence Jan. 1 following. The difference is probably chiefly due to the Iron Age including all furnaces that did not report, many of which may have been abandoned permanently some time before, as several are every year, even in prosperous times. Mr. Swank, for instance, finds six furnaces abandoned from Jan. 1 to June 1, the gain of one being due to the completion of seven new ones meanwhile. The Iron Age reported 437 furnaces out of 729 in blast July 1, 1881. Thus June 1 this year the number in blast was 19 per cent. less than last year and 19⅔ per cent. less than in 1881. But previously to 1880 this number was much less than now—277 in 1879, 248 in 1878, and 259 in 1877. What is remarkable is that so many furnaces could be closed in the last five months with so little apparent distress and shock to industry.—[Railroad Gazette.

THE Bay View Mills of the North Chicago Rolling Mill Co. started up last Monday, the scale having been signed.

THE vinegar manufacturers of the United States have formed a combination and advanced prices 33⅓ per cent.

Market Review.

OFFICE OF TRADE REVIEW AND WESTERN MACHINIST.
CLEVELAND, FRIDAY EVENING, June 22, 1883.

IRON ORE.

Furnace men continue buying in larger quantities,and negotiations are pending for several large contracts at present prices. The amount of ore on the docks here is variously stated at from 250,000 to 300,000 tons. Receipts the past week have been 21,888 tons, against 37,-248 tons last week; shipments, 13,657 tons, against 11,-158 tons last week. Lake freights have ruled steady, at $1 from Escanaba and $1.15 from Marquette and L'Ainse to Cleveland and Ohio ports. We quote:

No. 1 Specular and magnetic Bessemer Ores per ton	$7.50@ 8.00
No. 1 Specular (non-Bessemer) ores per ton	7.00@ 7.50
Bessemer Hematites	5.00@ 5.25
Non-Bessemer Hematites	4.25@ 4.75
Menominee Range Bessemer	6.25@ 6.75
Menominee Range non-Bessemer	5.00@ 5.25

IRON.

PIG IRON.—The situation is clearly outlined by H. S. Mould & Co., in their weekly circular as follows: "A fair volume of business is being done in pig iron, though there is not entire confidence on the part of consumers in present prices; however, with stocks being steadily decreased, we think that furnace men are justified in believing that the bottom has been reached and that any change in the situation must be an improvement. Much, of course, of the future of the trade depends on our crops; and though the wheat crop is undoubtedly going to be short, indications at present are for a good corn crop which will help us out. There are no large or speculative lots being bought that we learn of, purchasing seeming to be for actual short wants." We quote:

CHARCOAL PIG IRON.

No. 1 Lake Superior charcoal	$24.00@26.00
No. 2 Lake Superior charcoal	25.00@26.00
Nos. 3 and 4 Lake Superior	26.00@27.00
Nos. 5 and 6 Lake Superior	25.00@27.00
Nos. 1, 2, 3, 4, 5, Salisbury	35.00@37.00
Southern Car Wheel	28.00@33.00

BITUMINOUS AND COKE IRON.

No. 1 foundry, all lake ores	$21.00@22.00
No. 2 same	20.00@21.00
No. 1 foundry, lake ores, with cinder mixture	20.00@21.00
No. 2 same	19.50@21.00
No. 1 foundry, native Ohio ores	19.50@22.50
No. 2 same	20.00@21.00
No. 1 silvery, native Ohio ores	20.00@22.00
No. 2 same	18.00@19.50
No. 1 gray forge, red short	19.00@20.00
No. 1 gray forge, neutral	18.50@19.00
No. 1 Bessemer	22.50@23.00

MUCK BAR.—Some inquiry is made for muck bar but there is little in the market. Prices range $33a$34.

WROUGHT PIPE.—The stocks of dealers in this city are considerably broken, some sizes being very scarce. The probability that the tube works will shut down July 1 to make repairs and take stock will still further increase this scarcity. Trade is dull, and prices are off 5 per cent., the present discount being 70 & 10 for carload lots and 70a70 & 5 on less than carloads.

MANUFACTURED IRON.—The market has again relapsed into a state of dullness, and dealers say there is not much prospect of an increase in prices before Fall. We reduce our quotations 20 cents per 100 on bar and sheet. The steel market is very quiet, with no change in prices.

STEEL RAILS.—Orders are for small lots, quotations on which are $41a$42 (90 days). The mills are still running.

OLD RAILS.—There is a renewed inquiry for old rails, considerable sales at a shade off $22.50 being reported:

CINCINNATI.

[Reported for the TRADE REVIEW by E. L. Harper & Co.]

Notwithstanding large sales have been effected, and furnace stocks somewhat reduced, and the number of furnaces in blast gradually lessened, the trade in general is not satisfied that the bottom has been reached, and there is confidence wanting in prices current. This condition of things is unsatisfactory to both buyers and sellers, and while an improvement may not come at an early date, sooner or later and much earlier than many predict, the reaction will set in, and again a satisfactory market be realized, bringing alike to consumers and furnace men remunerative prices for their product. Th quotations below represent as nearly as can be presented, the general prices prevailing at this writing:

Foundry—Hanging Rock Charcoal, No 1, $23 75@$25 00; Hanging Rock Charcoal, No. 2, $22 75@$23 25; Strong Neutral Coke, No. 1, $20 50@$21 50; Strong Neutral Coke, No. 2, $19 00@$20 00; American Scotch, No. 1, $19 50@$20 00. Grey Forge—Neutral Coke, $18 00@$18 50; Cold Short, $18 00@$18 50. Car Wheel and Malleable—Hanging Rock Strictly Cold Blast, $28 00@$29 00; Hanging Rock Warm Blast, $24 00@$24 50; Lake Superior, 1 and 2, $24 00@$25 00; Lake Superior, 3 to 6, $25 00@$26 00; Southern Car Wheel Strictly Cold Blast, $28 00@$29 00.

[Reported for the TRADE REVIEW by Rogers, Brown & Co.]

The improved tone of the market has been well sustained through the week. Transactions have been liberal all through the Central West, and while there is no quotable advance in prices, the tendency is decidedly towards stiffness. The weak, uncertain tone of the past two months has given place to confidence in values that are quoted and for the first time in nearly four months, sellers, and not buyers, can fairly be said to be making prices. We know of a half dozen transactions since June 1, that have taken over 14,000 tons of Southern coke iron. We know also of a number of offers for round lots of Southern mill at $17.50 cash at Ohio River points that have been refused. One offer equal to $17.25 cash at Cincinnati was made by a leading consumer for 25,-000 tons. Stocks of standard grades are well cleaned up at the furnaces, and producers are feeling that the clouds are passing off. We quote for cash f. o. b. cars Cincinnati:

Hot Blast Foundry.—Hanging Rock Charcoal, No. 1, $23 50@$25 00; Hanging Rock Charcoal, No. 2, $22 00@$24 00; Southern Charcoal, No. 1, $22 00@$23 00; Strong Coke, No. 1, $21 00@$22 00; Strong Coke, No. 2, $20 00@$21 00; Strong Coke, No. 1, $19 50@$20 0; Soft Stone Coal, No. 1, $20 50@$21 00; Soft Stone Coal, No. 2, $19 00@$20 00. Forge—Strong Neutral No. 1 mill, $18 50@$19 50; Cold short No. 1 mill, $18 00@$19 00. Car Wheel & Malleable—Hanging Rock Cold Blast, $31 00@$33 00; Hanging Rock Warm Blast, $25 00@$27 00; Southern Car Wheel Iron, $27 00@$28 00; Lake Superior Car Wheel Iron, $25 00@$26 00; Lake Superior Malleable Iron, $25 00@$26 00.

CHICAGO.

[Reported for the TRADE REVIEW by A. B. Meeker & Co.]

The market is getting considerably more active, both the demand and prices showing improvement. We quote to-day (June 19):

Lake Superior Charcoal, 1 & 2, $23 50@$24 00; Lake Superior for Car Wheels, No. 3, $24 00@$25 00; Lake Superior for Car Wheels, 4 and 5, $24 00@$25 00; Scotch, according to brand, No. 1, $27 00@$28 00; Hanging Rock, Charcoal, No. 1, $26 00@$26 50; Hanging Rock Coke, No. 1, $23 00@$24 00; Anthracite, No. 1, $22 00@$24 00; Anthracite, No. 2, $21 00@$22 00; American Scotch, No. 1, $23 00@$26 00.

HARDWARE.

The chiefly noticeable feature in the hardware market the past week has been the advance in the discount by lock manufacturers from 45 & 10 to 50 & 10. The list has also been changed but has not yet been received here. Local manufacturers of hardware are running full time, and report trade steady but quiet. The general trade is quiet. Collections are scarcely satisfactory.

NAILS—Are in good demand, with leading sizes scarce.

OILS.

Trade has been quiet the past week, with no special request for any particular lines.

COAL.

Trade has been very light the past week, with no change in prices. The mines are still running regularly. Lake freights to Chicago are 75c; Sault Ste. Marie, 80c. Considerable speculation has been occasioned in the East regarding the report from Philadelphia that a gigantic anthracite coal combination had been formed, with Mr. Gowen at the head. With the New Jersey Central and the Reading, he controls 39 per cent. of the anthracite business, but should the Delaware, Lackawanna & Western act with him, he would secure a majority, namely 55 per cent. That he has done this is denied; that he might do it, is generally admitted.

METALS.

The metal market continuesto rule very quiet. No ales have been effected the past week except for small lots. Prices are off on copper from ¼ to ½ cents, while an advance of ¼ cent is to be noted in tin.

LUMBER MARKET.

PLANK—MIXED WIDTHS, 1¼ AND 1½ INCH.

A 1 & 2..$50 00 A 3..$40 00 B..$32 00 C..$21 00 D..$14 00 E..12 00

2-IN. 12, 14 AND 16 ft., TOGETHER.

A 1 & 2..$48 00 A 3..$40 00 B..$32 00 C..$21 00 D..$14 00 E..13 00

BOARDS—1 IN. MIXED WIDTHS.

A 1 & 2..$45 00 A 3..$36 00 B..$30 00 C..$20 00 D..$15 00 E..12 00

STOCK BOARDS—12 IN.

A 1 & 2..$45 00 A 3..$36 00 B..$35 00 C..$20 00 D..$15 00 E..12 00

STRIPS—6 IN.

A 1 & 2..$42 00 A 3..$ ... B..$35 00 C..$22 00 D..$17 00 E..12 00

FLOORING, SIDING AND CEILING.

Matched flooring.....A 3, $42 00 B, $38 00 C, $24 00 D,20 00
Matched drop siding, 6 in.A 3, $42 00 B, $38 00 C, $24 00 D, 18 00
¼ in. bevel siding.....A 1 & 2, $24 00 A 3, $20 00 B, 18 00
Beaded ceiling $2 higher than flooring.

BILLSTUFF.

Small joist, 12, 14 & 16 ft $13 00 a 18 ft .....$13 00@$14 00 | Small timb'r, 12,14,16,18 ft 14 00 larger than 8x8, special.
Long timber, 20 ft. and over, add about $1 per ft. to the price of short.

SHINGLES, LATH AND MILL WORK.

Shingles, XXX, 18 in.....$4 25 clears or clear butts.. $2 50@$3 00 | S, 1 S, $1.00; S, 2 S .....$1 50 Matching, flooring and drop siding.....$2 00@$2 50
Lath $2 75

Excursion Rates—Fourth of July, 1883.

The Pennsylvania Company, operating Pittsburgh, Fort Wayne & Chicago Railway; Cleveland & Pittsburgh R. R.; Erie & Pittsburgh R. R.; Ashtabula & Pittsburgh Railway; North Western Ohio Railway; Meadville Railway, and Alliance, Niles & Ashtabula Railroad, will sell cheap excursion tickets to and from all stations on the above lines on July 2d, 3d and 4th, good to return until July 5th, inclusive. Children between the ages of five and twelve years will be carried at one-half the excursion rate. Great preparations are being made at many prominent points to celebrate the day in an appropriate manner, and all the popular resorts will be filled with patriotic picnic parties. The rates will be very low, and everybody should turn out and enjoy the Glorious Fourth.

COMMUNICATIONS from practical men are always welcome, and will be promptly printed.

Books, Newspapers, Etc.

THE Cleveland Herald's Sunday cable specials are a notable new feature of that enterprising journal.

THE Spray is the title of a breezy little paper published by the Cape May Improvement Co., Cape May Point, N. J., a copy of which they send us.

FROM 24 the Baltimore Manufacturers' Record has been enlarged to a 28-page journal, and a handsome exponent of Southern industrial interests it is.

THANKS to Mr. James M. Swank, Philadelphia, Secretary of the American Iron and Steel Association, for copies of Tariff Tracts Nos. 2 and 5, entitled, respectively, "Fresh Facts—The Cost of Transportation of Western Products," and "The Tariff on Iron and Steel Justified by its Results." They are both timely and convincing.

A STRIKING feature of the July number of Demorest's Magazine (New York) is the plaster papier bas relief of the head of Perseus, which is not only a great novelty, but an exquisite work of art. A beautiful photogravure of a "Little Bride" also adorns the art department, and other illustrations are numerous. The literary articles are of a high order of merit, among which may be mentioned the continuation of the story "Out of the World," "Social Life at Smith College," "The Story of Hereward Leofricsson, the last of the English," "A Perfect Fright," "The Paupers of Pompeii," "The Rose in Song and Story."

IN the North American Review (New York) of July, President Julius H. Seelye writes of "Dynamite as a Factor in Civilization;" in The Last Days of the Rebellion" Lieutenant-General P. H. Sheridan recounts the operations of the cavalry divisions under his command during the week preceding the surrender of Lee; William S. Holman, M. C., writes on "The Increase of Public Expenditures": Dr. O. B. Frothingham discourses on "Democracy and Moral Progress": Z. R. Brockway, Superintendent of the Reformatory at Elmira, N. Y., points out some "Needed Reforms in Prison Management"; Thomas Sergeant Perry writes of "Science and the Imagination"; Geo. E. Waring, Jr., of "Sanitary Drainage"; Elbridge T. Gerry of "Cruelty to Children"; and finally there is a symposium on "Church Attendance"—the question whether the churches are growing to be less of a power for good now than in former times—the symposiasts being "A Non-Church-Goer," Rev. Dr. Wm. Hayes Ward, Rev. Dr. James M. Pullman, and Rev. Dr. J. H. Rylance. Published at 30 La Fayette Place, New York.

The Production of Street Rails in the United States.

We have carefully separated the statistics of the street-rail production of the United States from the general figures of rail production, and present them below for the past ten years, classified in each year according to the material from which they were made:

Net tons of 2,000 pounds.

Years.	Iron.	Bessemer steel.	Open-hearth steel.	Total.
1873	9,430	.....	.....	9,430
1874	5,739	1,000	.....	6,739
1875	14,032	2,308	.....	16,340
1876	9,523	3,563	.....	13,086
1877	5,746	1,269	.....	7,015
1878	7,512	417	1,300	9,229
1879	2,833	4,933	880	8,646
1880	8,839	7,355	700	16,894
1881	12,464	7,990	1,100	21,554
1882	11,167	6,949	4,170	22,286

—[Bulletin Iron and Steel Association.

MALLEABLE iron castings are merely iron castings treated by an annealing process to make them malleable. Less than five years ago one could count upon his fingers all the establishments in this country making malleable iron castings. Now they have multiplied, not only in number, but in capacity, far beyond the ratio of the increase of general iron manufactures. These castings have been improved about a hundred per cent in quality, and at the same time made lower in price.

ADVERTISING in the TRADE REVIEW pays.

Cleveland Wholesale Prices.

[The lowest quotable prices are given in all cases.]

HARDWARE.

Adzes.

Carpenter's	per doz $18 40
Ship	" " 18 75
Heavy railroad	" " 19 50

Axes.

	per doz.
James' 2d qual	$7 00
Buckeye	8 00
" doub. bitt	15 00
Hunt's	9 50
Mami's	8 00
Lippincott's Crown	8 50
Cut More	9 00
Peck's Double Bit	22 00
"Champion Blade	11 00
Good triple silver steel	11 50

Axles.

Standard list,
Nos. 1 to 6, 50 & 10 off
Nos. 7 to 14, 50 & 5 off
Nos. 15 to 18, 45 off
Nos. 19 to 22, 50 & 5 off

Anvils.

	per lb.
Eagle, Amer	10c dis 20
Wright's	11¼c@11c
Armitage's Mouse Hole	9¼c@9¾c
Trento	10¾c
Wilkinson's	10¾c

Anvil Vise and Drill.

Millers Falls Co. $28 ....dis 20
Cheney Anvil and Vise dis25&2

Augurs and Bits.

C S cut augers .....dis 50&10
do do do bits.....50&10
D C gimlet do Ives..dis 50
Snells bits .....dis 40&10
Russell Jennings' augers, dis 10&10&10
Cook's pat augur.....40&10

Animal Pokes.

Akron	$ 3 50
Camp's	4 00
Berea, per doz	4 00
Eagle, per doz	5 00

Apple Parers.

Domestic & Reading ℔ doz. $7 50
Turn Table..... 5 00

Bolts.

Machine	dis 70
Plow	dis 50
Plow, R. B. & W	dis 40
Cast Iron Barrel Shutter, etc	dis 55&10
Cast Iron Chain (Sargent' list)	dis 60&10
Ives' Pat. Door Bolts	dis 50
Wrought Barrel	dis 55&10
Wrought Square	dis 55&10
Wr'g't Shut'r, all iron, Stanley's list	dis 50&10
Fire, R. B. & W., new list	dis 70&10
Stove, American Screw Co.'s	dis 40
B. B. & W	dis 40
Bolt Ends 16c. per lb net	60

Bellows.

	Dis
Bl'ksmith's com new list, 45 ℔ ct	
Moulder's new list, dis 25 ℔ ct	
Hand, new list, 25 per cent	

Butts.

	Dis
Wrought brass	65&10
Cast, loose joint	60&10
Pin, loose	55&10
Wrought, fast joint narrow	50&10
Wrought fast joint broad	50&10
Wrought loose joint broad	55&10
Wrought table and back flaps	50&10
Loose joint, without acorns	55&10

Ten per ct. extra dis for cash.

Boiler Plates.

"Gaylord"-Standard Quality.

C. No. 1	4 50
C. H. No. 1 Sheil	4 75
C. H. No. 1, 50,000	5 25
C. H. No. 1, 55,000	5 75
C. H. No. 1 Flange	6 50
Firebox	
T. S., 60,000 (as per)	6 50
T. S., 65,000 (act of)	

Homo. Steel, 70,000 (of Cong) 7 50
Heads, ¼c ℔ lb. extra.
N.B.-Eastern brands of boiler plate at from 2-10 to 3-10c ℔ lb less than above prices.

Boiler Tubes.

"National" Standard Gauge 1 inch to 10 inch.....dis 37½
"National" Standard Gauge 11 inch to 15 inch ... dis 25
"National" Special Locomotive Tubes ....net list

Bag Holders.

Sprengle's Pat, $18.00 per doz 40 per cent. dis.

Boiler Makers' Tools.

Doty's Power Shears	net list
" Hand Lever Shears	net list
" Power Punch	net list
" Hand Punch	net list
Steel Screw Punch	net list
Iron Screw Punch	net list
Boiler Plate Rolls	net list
Buffalo Forges & Blowers	dis 20
Watson's " "	net list
Spring Tube Expander	dis 15
Roller Tube Expander	net list
National Tube Cleaner	dis 20
Wire Flue Brushes	net list
Anvils—'Peter Wright'	12¼ ℔ lb
Solid Box Vises	net list

Cleveland Stamped Elbows

Genuine Russia Iron

4½inch, per doz			5 50
5	do	do	7 50
6	do	do	9 50
7	do	do	11 00

Charcoal Iron

4½inch, per doz			2 50
5	do	do	3 50
6	do	do	4 25
7	do	do	5 50

Planished Amer. Russia Iron

7½inch per doz			5 00
4	do	do	6 50
5	do	do	9 50
6	do	do	8 05

Discount 33⅓ per cent

Chisels.

Hot and cold cutting	℔ lb 30
Railroad track	30
Machinists	30
Mallet head	50
Tape	50
Packing	50
Stone cutters	50

Crowbars.

Cast steel	℔ lb 7
Iron, steel points	5c

Cutlery, Pocket and Table.

Meriden Cutlery Co., table	net
Am. Miller Bros.' Cutlery Co	dis 25
Humason & Beckley, pocket	33⅓
Naugatuck Cutlery Co. list	net
Aaron Berkenshaw's pocket	dis 25
Fram Cutlery Co., table	net
Cleveland Cutlery Co.	dis 25
Miller Bros., pocket	33⅓
Akron Cutlery Co	dis 45

Coopers' Tools.

Bradley's	dis15@20
Braton's	dis15@20

Chains.

Coil by cask,

3-16	¼	5-16	⅜	7-16	½
10¾	9	8	7	6½	6¼

Drills and Drill Stocks.

Blacksmiths', each $2.50	dis 10
Blacksmiths', self-feeding, each 7.50	dis 20
Breast, P. S. & W	dis 20&10

Drawing Knives.

Peck, Stow & Wilcox	dis 70
Witherby's	dis 65@10
Nobles Mfgr. Co	15
Adjustable handle	20

Emery and Sand Paper.

Regular Numbers	℔ lb 6c
Flour and F. F	℔ lb 4c
B. & A. Emery Paper	dis 30&5
Sand paper	dis 30&5

Enameled & Tinned Ware.

Kettles	dis 50
Sauce Pans	dis 30
Tinned Sauce Pans	dis 30

Files.

Parkin's $5 to £	dis 50 ℔ cent
E.M. Boynton's, new list	dis 25
J. & Riley Carr	4.50 to £.
Johnson & Bro	dis 50
Butcher's	4.50 to £.
Walter Spencer & Co.'s "Diamond"	4.50 to £.
Fisher's	4.75 to £.
Moss & Gamble	4.50 to £.
H. Disston & Sons (new list)	dis 50 per cent
Heller Bros.' Horse Rasps	dis 35
Nicholson	dis 50
New American	dis 50
Union File Co	dis 50

Grindstones.

Beroa	1@1½ ℔ lb
Ohio	1½@1⅞ ℔ lb
Nova Scotia	1½@1¾ ℔ lb
Lake Huron	1@1½ ℔ lb

Hammers.

Maydole's	dis 15
Cheney's	dis 25
Hartford Hammer Co	dis 20
Humason & Beckley	dis 50
Verree	dis 5
Magnetic Tack, Nos. 1, 2, 3, $1.25, $1.50 and $1.75	dis25&10
Nelson Tool Works	dis 40&10
Warner & Noble's	dis 5
Kip's	dis 15

Hatchets.

Buckeye	Shingling,
Nos. 1, 2, 3, ℔ doz $7 50, $8 00, $8 50	dis 33⅓
Claw, Nos. 1, 2, 3, ℔ doz $8 25, $8 75, $9 25	dis 33⅓
Lathing, Nos. 1, 2, 3, ℔ doz $7 50, $8 00, $8 50	dis 33⅓

Hinges.

Champion double acting spring hinges	dis. 30
Screw & Strap 8@12 in.	$5. net
Gravity Locking Blind Hinges, Sargeant & Co.	70&10
Clark & Co	70&10

Locks.

Whipp e Mfg Co	45 & 10
Norwalk Lo Co	45&10

Nails.

10 to 60d	$3 10
8 and 9d	25
6 and 7d	50
4 and 5d	75
3d	1 50
2d	2 75
3d fine	3 00
2d fine	3 75
⅞ inch	3 00
4d barrel	1 00
1¼ inch barrel nails	1 50
1¼ do do do	1 75
1 do do do	2 50
⅞ do do do	3 00
Cut spikes, all sizes	35
Clinch nails, all sizes	1 75
Casing and box nails	75
Finishing nails,	$1 25
Tobacco nails,	50

Nuts and Washers

Nuts, square	7¾c off list.
Nuts, hexagon	8c. off list.
Washers	7c. off list.

Nuts, Bolts, etc.

Square & Hex. Nuts	8 off list
Washers	7c. off list
Machine Bolts	dis 70
Bolt Ends	dis 70
Boiler Patch Bolts	net list

Picks.

Railroad, 4 to 5 lbs.	doz $6 60
5 to 6 lbs.	7 20
to 7 lbs.	7 80
7 to 8 lbs.	8 40
Railroad Tamping Pick 7 to 8 lbs.	doz 10 80
Mill Picks per lb	7c

Planes.

Ohio Tool Co	dis 20
Sciota	dis 25
Bailey's Pat. Adjstbledis	20@10
Sandusky, fancy	dis 15
Buckeye	dis 20
Ogontz	dis 25

Rivets.

on	dis 40
inned	dis 40
opper	dis 50

Rules.

Stanley	dis. 70 &

Squares.

	D.s
Steel or iron, case lots	50
Try squares and T bevels	40

Spikes—WROUGHT

All lengths by ¼ inch	4½c
do do do 5-16	3½
do do do ⅜, 7-16 & ½ in	3¼

Shovels and Spades.

Ames' new list, July 1, 1881	dis 15
Old Colony	dis 15
Remington's (Lowman's Patent)	dis 30
Bishop	dis 50
Chisholm	dis 25@30
Rowland's	dis 40 and 10
Griffiths	dis 40&10

Sad Irons.

From 4 to 10 lbs. per lb	3½ net
Self-Heating	℔ doz $9 net
" Tailors	℔ doz $18 net
Gleason's Shield and Toilet	dis 25
Mrs. Pott's Irons, double pointed	dis 35
Mrs. Pott's Irons, square back	dis 35
Enterprise Star Irons	dis 35
Combined Fluter and Sad Iron	℔ doz $15, dis 15

Saws.

Disston	dis 20
Disston's Circular	dis 40
Disston's hand panel, rip, &c	dis 20
Boynton's lightning cross cut new list	dis 40
Boynton's circular and mill	dis 40
Boynton's ice	dis 25
Boynton's lightning hand panel and rip	dis 25
Livingston's butcher and kitchen	dis 20
Livington's framed wood Nos. 101 102 103 104 105 doz $10 8 50 10 7.50 6.20	net
Peace circular & mill	dis 40
Peace hand panel and rip	dis 25
Peace band saws, all widths	dis 10

Scales.

Hatch, Counter, No. 171 ℔ doz. $42,	dis 37½&10
Union Platform	$6, dis 45
Fairbanks'	dis 20
Buffalo Scale Co	dis 40
Forsyth Scale Co	dis 25
Howe's	dis 20&10
Chatlilon's Eureka	dis 25
Family Universal	dis 50
Scale Beams	dis 33⅓&10

Screws.

	Dis
Flat head iron or steel [new list] per cent dis.	50&10
Flat head brass	50&10
Round head iron or steel	45&10
Round head brass	40&10
Brass and Silver capped	30
Japanned, list of Plain Screws	40
Coach, patent Gimlet point, list per 100	65
Lag, taper points	65
Bed	10
Machine, flat head, iron	55
round head, iron	50
Bench, iron	55&10
wood, beech, per doz $3	10
wood, hickory	20&10

Tinners' Tools & Machines

Machines (P. S. & W.)	less 10
Tools (P. S. & W.)	" 20

Plumbers', Steam and Gas Fitters' Supplies.

Wrought Iron Pipe	dis 70
Malleable Iron Fittings	list
Grey Iron Fittings	dis 50
Steam Brass Goods	dis 55
Water " "	dis 50
Ludlow Gate Valves	dis. 20
Register Gauge Cocks	net 1 00
Montg'ry Gauge Cocks	$1 each
Steam Gauges	dis. 40
Steam Guages 5 in. net dial per doz	30 00
Scotch Glass Tubes	dis. 60
Tools	special.
Duplex Injectors	net.
Soil Pipe & Fittings, Mott's List	dis. 30
Sinks, Mott's List	dis. 25
Copper Bath tubs, sinks, etc	dis. 25
Galvanized Iron Boilers "Scaifes."	dis. 50
Marble Slabs, Counter-sunk net per ft	$ 1 25

Sheet and Tank Rivets.

"Norway."

All sizes.....dis. 15

Boiler Rivets—"Albany."

⅛, ⅙, 11-16, and ¾ in. diam .5 50

Valves.

	Dis.
Jenkins' Patent Gate Valves	35
" " Globe "	40
" Standard Packing "	20

Vises.

Solid Box, list of July 1, '79	dis 40
Solid "Crown" (A. H. Hildick)	40 to 100 lb. 15c net
Solid, Peter Wright's	15⅓
Solid, Wilkinson's	13⅓
Parallel, Parker's	dis 40
" Simpson	dis 20
" Prentiss	dis 15
Saw Filers, Hopkins' ℔ doz $17.50,	dis 10
" Wentworth's	9 00
Reading	dis 45&10
Lowell Hand Vises	dis 20
Richardson's Vise and Anvil	dis 25

Wrenches.

Coe's genuine	50
Girard Standard	dis 50 & 10
Mechanics' 10 and 10	dis. 50
P. S. & W. Mechanics	dis 50&10
Agricultural	dis 70

Wire.

Brass and Copper	dis 30
Bright & annealed, Nos. 0 @ 18	dis 50@55
" " Nos. 19 @ 26	dis 60
" Nos. 27 @ 36	dis 65
Coppered Nos. 0@18,	dis 45@50
Galvanized, Nos. 0@18, market list,	dis 45@50
Tinned, Nos. 0 @ 18,	dis 45@47½
Cast steel	dis 40
Tinned Broom Wire, Nos. 18@25	dis 55
Annealed Fence, Nos. 8 and 9	dis 60
Annealed Grape, Nos. 10 to 14	dis 60
Galvanized Telegraph, Nos. 7 to 9	℔ l
Galvanized Telegraph, Nos 10 to 11	℔ lb 8¼c
Galvanized Telegraph, No. 12	℔ lb 10¼c
Fence staples	℔ lb 5½@5¾c
Fence Staples, galvanized,	℔ lb 6¼@6¾c
Stubs Steel Wire $6 00 to	dis 3[illegible]
Barb Wire, painted	7⅛8
Barb Wire, galvanized	[illegible]c
Crucible Steel Ropes fro	⅜ in. at 9c to 1¼ in. at 52c
Best Selected Iron Ropes from 3-16 in. at 3c. to 1¼ in. at	33c

TINNER'S STOCK.

Tin.

Banca,	per lb. 23
Straits	" 22c
English	" 22½c
Bar	" 24c

Tin Plate,

IC 12x12 charcoal	$ 6 75
IC 14x20 do	6 45
IX 14x20 do	8 20
DC 12½x17 do	7 00
DX 12½x17 do	9 00
DXX, 12½x17 do	11 00
DXXX, 12½x17 do	13 00
IC, 20x28 do	13 75
IX, 20x28 do	17 25
IC, 14x20, Best Roof	5 90
IX, 14x20, do	7 65
IC, 20x28 do	11 85
IX, 20x28 do	15 35
IC, 10x14 Best Coke	6 00

Solder.

Half and Half, in bars	15
No. 1 do	14
Spelter Solder	25

Fat Planished Sheet Iron

[A]	per lb 10 8-10c
[B]	9 8-10c

Nos	10	15	21	25
to	14	20	24 & 26	
Com	3-40	3-60	3-75	3-95
Char	5-60	5-60	6-00	6-20

Sheets over 28 in. wide ¼c extra.

Zinc.

Sheet, cask	7c
Sheet, open	7½c

BRASS.

Cash prices for Roll and Sheet Brass. For less quantity than 100 lbs. add 3c per lb.

High Bra.

All Nos not thinner than No 28, wider than 2 in. not wider than 14 inch 30c
All Nos to No. 28 inclusive, and widths over 14 to 20 in. inclusive 35c
All Nos to No. 28, inclusive, and widths over 20 to 30 in. inclusive 38
½c per lb advance on each No above Nos 28 to 38, inclusive.
All Brass thinner than No. 8 is Platers' Brass at 53c
Sheets 24x48, and all sheets cut to particular sizes and lengths under 30 inches, in width wider than 2 inches 37c

Low Brass.

4c pr lb. more than High Brass
Gilding metal 8c per lb. more than High Brass.
Platers' or Gold Metal

In Bars	48c
Sawed	51c
Planed or Polished	54c

For Slitting.

Metal in width in. to ⅛ in. to No. 28, inclusive, 1c per lb, advance.
Metal, in width 2 in. to 1 in. thinner than No 28, 2c per lb. advance
Metal, in width ⅛ in to ¼ in thinner than No 28, 5c per lb advance.
Metal ¼ in. in width and less, 10c per lb. advance.
Any of the above widths cut to particular lengths add 7c per pound.

COPPER.

Lake ingot	16@16¼c
Baltimore	15 @15⅝
Arizona	15¼@15¼c
Pike and cant hook	8¼
Coal and granite	9

SCRAP IRON AND OLD METAL.

[Reported by H. L. & E. A. Schwarzenberg.]

DEALER'S BUYING PRICES.

	Per Ton.
No. 1 h. R wro't scrap	$20
No. 1 wrought scrap	20
No. 1 Machine cast scrap	15
Stove plate (free from burnt iron)	11 00
Grate bars	7
Pipes and flues (clean)	14
Tank iron	14
Hoop and band iron	10
Light sheet iron	9
Axle turnings	15 00
Wro't turning (f from cast)	13
Wro't iron, oily drillings	9
Cast borings	8 50
Malleable iron	9
Uncut wro't iron boilers	15
Old copper per lb	11
No. 1 H. Brass per lb	11
Heavy yellow Brass do	9@10
Light Brass per lb	7@9
Scrap Zinc per lb	3@4
Tea Lead per lb	8
Heavy Lead per lb	4

PIPE, WROUGHT.

Standard Wrought Iron Lap Welded Steam and Gas Pipe

Inside Diameter. Inches.	Plain, Price Per Foot.	Galvan or Enameled Per Foot.	Outside Diameter Inches.	Weight Per Foot.
⅛	08		.40	.24
¼	08	$0 11	.54	.42
⅜	09	12	.67	.56
½	11	15	.84	.85
¾	13½	19	1.05	1.13
1	19	28	1.31	1.67
1¼	27	40	1.66	2.26
1½	33	47	1.90	2.69
2	46	64	2.37	3.66
2½	75	1 00	2.87	5.77
3	95	1 30	3.50	7.55
3½	1 25	1 70	4 00	9 05
4	1 50	2 05	4.50	[illegible].73
4½	1 75	2 40	[illegible].00	12 49
5	2 25	3 00	5.56	14.56
6	2 [illegible]	4 00	6.62	18.76
7	3 75	....	7.62	23.00
8	4 75	....	8.62	28.00
9	6 50	....	9.68	34.42
10	8 00	....	10.75	40.64
12	12 00	....		54.65

Discount, car load lots, 70 and 10 per cent Less than car load 70 to 70&5.

COAL,

WHOLESALE.

Wholesale f. o. b. cars at Cleveland:

Carbon Hill and Monday Creek	$2 50
Massillon	2 70@2 80
Palmyra, lump	3 25
Brier Hill	3 50
Pittsburgh	3 00
Salineville	2 25
Tuscarawas	2 40
Anthracite grate	5 18
Anthracite egg	5 27
Anthracite stove	5 49
Anthracite chestnut	5 49

RETAIL.—Delivered.

Massillon Lump	$4 00
" Nut	3 75
Carbon Hill and Monday Creek, lump	3 50
Carbon Hill and Monday Creek, nut	3 25
Straitsville, lump	3 75
Straitsville, nut	3 50
Palmyra, lump	4 50

75c less on cars by car load.

Anthracite Stove and Chestnut	6 25
Egg and grate	6 00

OILS.

Pure Oils. p'kages included

Sperm, winter bleached per gal	1 30@1 33
Whale, winter bleached per gal	66@69
Straits	48@52
Bank	46@50
Lard oil extra W S	83@85
do No 1 do	73@75
do No 2 do	63@65
Tallow oil	73@76
Neatsfoot oil pure	95@$100
do No 1	80@85
Linseed oil, raw	57@60
do do boiled	60@63
Cotton seed oil white	58@62
do do yellow	57@61
West Virginia lubricating 28 deg	18c@25c
Paraffine oil winter pressed	22@25
Capitol Cylinder	85
Model do	65
Eldorado Engine	50
Turpentine, per gal	43

GLASS.

(Per box of 50 feet)

SINGLE THICKNESS

6x8 to 10x15	
11x14 to 15x24	8 50
16x24 to 20x28	9 75
15x34 to 24x30	10 75
26x28 to 24x36	11 50
26x36 to 26x44	13
26x46 to 30x50	14 00

DOUBLE THICKNESS Dis50&10

6x8 to 10x15	11 7
11x14 to 15x24	13 25
16x24 to 20x28	15 75
15x34 to 24x30	17 25
26x28 to 24x36	18 50
26x36 to 26x44	[illegible]

Di

Babbitt Metal.

Babbit Metal, No. 3, 14 X	42
Babbit Metal, No. 2, 16 XX	46
Babbit Metal, No. 1, 18 XXX	50
Babbit Metal, C	20
Babbit Metal, B	24
Babbit Metal, A	32

Dis 40 per cent.

IRON AND STEEL.

Flat Bar.

1½ to 4 by ⅜ to 1 inch	1 90
4½ to 6 by ⅜ to 1 inch	2 00
1¾ to 6 by 1⅛ to 1½ inch	2 30
1¾ & 1¾ by ⅜ to ¾	2 00
1 & 1½ by ⅜ to ¾	2 10
⅝ ¾ and ⅞ by ⅜ to ¾	2 30

Round,

1 to 1⅞ inch	2 00
2 to 2⅝	2 10
2¾ to 3¼	2 40
3⅜ to 4	2 90
4⅜ to 4½	3 40
4¾ to 5	3 60

Square.

1 to 1⅞ inch	2 00
2 to 2⅝	2 10
2¾ to 3¼	2 40
3⅜ to 4	2 90
4⅜ to 4½	3 40
4¾ to 5	3 60

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	2 10
1 to 1¾ by ¼ and 5-16 do	2 20
¾ to ⅞ by ¼ and 5-16 do	2 40
⅝ to ⅞ by ¼ and 5-16 do	2 80

Half Oval and Half Round.

Wagon box iron ¾ and ⅞ 3 50
1-10c per lb extra will be charged for cutting to specified lengths

Light Band.

1¼ to 6 by ¼ to 3-16 ..... 2 70

Hoops.

1¼ to 2 , Nos 16 to 18	3 10
1¼ to 4 do 13 to 15	3 00

1-10 extra for each gauge lighter

Sheet Iron.

No 22 to 24	3 50
No 25 to 26	3 70
No 27	3 90
No 28	4 30

English Steel.

Best cast	℔ lb 16c
Extra cast	16¼c
Round machinery	10c
Swaged, cast	18c
Best double shear	15½c
Blister, 1st quality	13c
Refined tool steel	16¼c
Spring calking	7¼@7¾c
German steel, best	11c
2d quality	10c
3d quality	9c
Sheet cast steel, 1st quality	15½c
2d quality	14½c
3d quality	12½c

American Steel.

Best brands of refined cast steel, ⅜ to 2 inches	12c
Crucible cast	7c
Open-hearth ditto	4½c
Hammer cast steel	9c
Spring cast steel	7½c
Bessemer and open-hearth spring	5c
Ditto plow	4½c
Steel boiler plate	6½@7c
Bessemer machinery	5 @6c
Spring and calking	7¼@7½c
Tire	5
Sleigh shoe	5

Bessemer Steel Tire.

¾ to 1 by 3-32	4½ ℔ lb
¾ to 1 by ⅜ to 5-32	4½ ℔ lb
¾ to 1 by 3-16 to ¾	4½ ℔ lb

Miscellaneous Cast Steel.

Auger and auger bit	10
Axle steel for wagons	7
Frog points and plates	8
Frog size bars	8
Pick, hammered	10½
Mattock, beveled	9
Table cutlery	7½
Trap spring steel	10

AMERICAN MECHANICAL ENGINEERS.

[Concluded from Page 8.]

nearly always sagged in the way, and balances must be used to keep it taut.

The afternoon session began with an interesting description of

THE BOWER-BARFF PROCESS FOR RUSTLESS IRON.

BY PROF. G. W. MAYNARD, OF NEW YORK CITY.

Iron, he said, was the most easily manipulated of all metals. Fine work had been done in this direction, but the question of preventing rust had become a most serious one, and any invention that produces results endurable and pleasing to the eye will be hailed with delight. The Barff process was successful enough but was so costly to use that it was not taken advantage of by the iron and steel trade. The mode or composition of the Bower Barff substance was given by the author. The cost had been lessened by the energies of Prof. Bower and his son until it was now low comparatively. Carbonic acid produces a metallic film upon iron, but would not stand the exposure unless put through a system of fires, explained by the writer. Beautiful results were obtained by Prof. Maynard in his experiments on the process and also equally bad ones which he had overcome. Rusty iron could be rendered rustless through the means used. Improvements had been made from the English method, on account of the coal in America, and the trial of petroleum, which was found to be much better; sawdust also being used. Super-heated steam was used to reoxodize any ore coated substances with good results. Polished work coated and rubbed up by a composition of emery and oil leaves a bright, clear surface. Outside work is left in the furnace for coating eight or nine hours, but indoor work only needed a slight, filmy coating. The temperature could be raised to a degree to cement the pieces together by means of the melted oxide. Extracts from foreign papers were read, which demonstrated the difference between substance under consideration and paint or galvanized iron, this not rusting or being effected by plunging it into water after its being heated to white heat, or after being left in urinals for a long period, this showing that acids had no effect upon it. The furnace used at the Hecla Works was described in a few words by the author.

Questions by several members brought out the fact that the new process was especially valuable in plumbing work, etc. The next paper was on

STANDARD CAST IRON FITTINGS.

BY W. J. BALDWIN, OF NEW YORK CITY.

Mr. Baldwin spoke of the divergence in the style of patterns, some houses making several different sizes of similar fittings. Having no standard to control trade, some manufacturers lowered the prices, necessarily lightening the weight at the same time. Others were compelled to follow. Some of the faults of the fittings now were that they were too light and the radius to short. He recommended the following, after Robert Briggs:

1. That a minimum thickness of metal be established for the different parts of a fitting, according to its prime denomination, above which makers may go if they desire, but below which fittings will not be standard,

2. That the radius of a fitting be fixed, and that it shall bear common relation to the diameter of the pipe.

3. That elbows, tees, and crosses of the same prime denomination shall have the same lengths from centers to ends of hubs.

4. That the length of a fitting from its center to the end of the hub bear some common relation to the diameter of the pipe.

5. That a standard fitting must have a standard weight, below which it must not go.

6. That all fittings be tapped with a taper, 1 in 32 to the axis of the openings—1-16 of an inch in length of thread—and that the present established method, which is not accurate, though capable of maintaining uniformity in diameter, be retained until such time as methods founded on the standard gauge system be adopted.

7. That a minimum length of thread be established for fittings in proportion to the size of the pipe, below which they will not be standard.

The difficulties arising out of the fact that there existed no standard for fittings were brought out in the subsequent discussion, and the necessity of the Society adopting the Briggs scale was urged, but no action was taken. The subject of the very interesting paper next read was—

THE EVAPORATIVE POWER OF AMERICAN COALS.

BY WM. KENT, OF PITTSBURGH.

The auther criticized the tests made by Prof. Johnson and was especially severe on Gen. Meigs' experiments in the War Department. The report of Prof. Johnson had failed to speak of the power of coals found West of Pittsburgh and of no bituminous coal found East. The speaker mentioned the experiments of the War Department, on the power of coals in American soil. It was not satisfactory, because the coal used in the army was to heat only, while they held that it had the same relative power to raise steam in a good boiler. which is not a fact. The results of Gen. Meigs' experiments were given by Mr. Kent. Of 25 butuminous coals tried, 22 show results lower than in the former reports. The Scotch coal, which showed the lowest result ot all the coals in Prof. Johnson's experiments, were higher in some experiments of the "Little Giant" boiler. The bituminous coals West of Pittsburgh were not tried by Johnson, nor do the figures of Gen. Meigs give any results. Almost any furnace is found good to burn anthracite coal, and semi-bituminous coal containing over 20 per cent. of volatile matter, but furnaces of special adaption must be used for others of higher degree. The semi-bituminous coals of Pennsylvania and Cumberland, Md., show good results under almost any conditions, taking Pennsylvania anthracite as a standard. Scotch was lower than these.

After C. C. Collins, of Erie, Pa., had verbally explained the principle of the balanced valves perfected by him, an interesting explanation, by the aid of specimens, was given of the—

REULEAUX KINEMATIC MODELS,

BY PROF. J.BURKITT WEBB,OF CORNELL UNIVERSITY, ITHACA, N. Y.,

The old methods, while they teach us a great many necessary and interesting things about the different mechanisms, have various defects, summed up somewhat as follows by Prof. Kennedy.

1. Each mechanism is discussed as a whole, no attempt being made to analyze it.

2. No general treatment is attempted, each mechanism being treated separately,with scarcely any discussion of the various forms which a mechanism may take, or of its relation to others.

3. A mechanism is discussed more with reference to its ordinary applications than for itself or any new uses for which it might possibly be suited.

Reuleaux remedies these defects by a radical analysis, in which he reduces all machines to their simplest element, which are always found in pairs. Any two pieces working together and having but one possible motion with respect to each other is such a pair of elements. Upon examination we find that we have three such pairs, which are very simple; First, a screw working in its nut; secondly, a journal or pivot revolving in its bearing or step; third, a block sliding on a prismatic bar. It will easily be seen that almost all machines are made up of such elements. These are called the lower or closed pairs and have these peculiarities: If you have one of a pair the other can be formed by casting (say plaster of paris) around it; or to state it another way, we have surface contact between the elements; secondly, it makes no difference which element of a pair be made stationary, exactly the same motion results for the other element.

There are, however, many other forms which will work together with a perfectly definite motion, and which, therefore, constitute pairs, called, however, higher pairs. The characteristics of a higher pair are that if you have one of a pair and give it a definite motion, you may (while it moves) cast the other element upon it. Here you get line instead of surface contact,and the motion will be different, according to which element is fixed.

Reuleaux then puts the pairs of elements together and forms a kinematic chain. To do this he connects one element of a pair rigidly with an element of another pair, and such a piece connecting two (or more) elements is called a link; the links and elements must also be chosen so that each link has a perfectly definite motion, with reference to the others. If now one link of a kinematic chain be fixed, the others will have definite motions, and the whole is then called a mechanism, and a combination of mechanisms is a machine.

The paper suggested as a defects of Reuleaux's system that the requirement that the motion of one element of a pair must be perfectly definite is too strict.

The paper of Oberlin Smith, of Bridgeton, N. J., read Thursday evening, on "Spiral Springs, Compressive and Tensile," called out considerable discussion. The next paper was entitled—

SOME NOTES ON STEEL.

BY G. C. HENNING, PITTSBURGH.

Mr. Henning spoke of the great use to which steel is put in all work, and questioned the obtaining of good steel in this country, comparing that of others with it. The large structures composed of steel in this country, about one-half a dozen in number, were named. He said the quality of the material used in a structure depended upon the judgment of the engineer in charge of the work, and also on the discretion of the manufacturer of the steel used. Bars made by different methods were explained as to the manner of their manufacture from the iron. Tests made on these bars were also given. In punching holes in steel bars intended for the East River Bridge he gave the elastic limit and other tests used to ascertain how far from the edge of the hole the steel is affected, and how much the hole must be rimmed out to restore the material to its original strength, these tests determining that holes of too large sizes are usually punched, and that they should be made smaller, and then rimmed out afterward. A defective plate, which had been seen by him on board a ship, was illustrated by a tracing, and the mode he advised to restore it. He thought the present methods of shearing and punching steel must soon be done away with and other methods used. Structures made of steel could be constructed cheaper than with iron, an assertion he said he could prove by figures in his possession. The proportion would be as if an iron structure would cost $100, a steel structure would cost $87.

At the conclusion of a paper by W. F. Durfee, of Bridgeport, Conn., on "Machinery for Maneuvering Clutch Couplings," and the passage of complimentary resolutions, the society adjourned to meet next November in New York. A number of valuable papers not read we have on file for early publication.

School of Electrical Engineering.

Mr. Edison is said to have offered to Columbia College the collection of electrical instruments exhibited at Paris last year, on condition that the college shall establish a school of electrical engineering. The offer is now under consideration, but it is thought that the cost of maintaining such a school will be considerable and the trustees consequently refrain from making any definite promises. Meanwhile, it appears, Mr Edison has resolved to begin the systematic instruction of electrical engineers in a school to be established in this city. The extent of the business of the Edison Co. is said to be so great that competent men can not be obtained to take charge of the work, and a practical training school under such auspices will therefore, without doubt, be successful and valuable. As a matter of general interest we would state that electrical engineering departments have already been established by different institutions in the country, as, for example, the Massachusetts Institute of Technology, which will soon be ready to graduate its first class, Cornell University, and the Stevens Institute of Technology, Hoboken. The department in question at the latter institution is of comparatively recent origin, and it yet remains to be seen whether it will be productive of beneficial results.—[Mechanics.

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Expanding Water Conductor
MANUFACTURED BY THE
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LIMITED,
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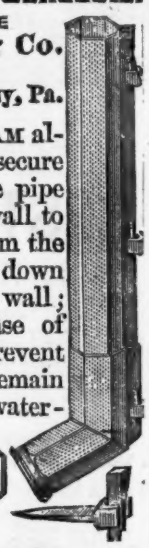

THE STANDING SEAM allows of an easy and secure fastening, keeping the pipe far enough from the wall to make any overflow from the cave pipe or head, run down the spout, and not the wall; and will open, in case of freezing, so as to prevent bursting, and still remain double-locked and water-tight.

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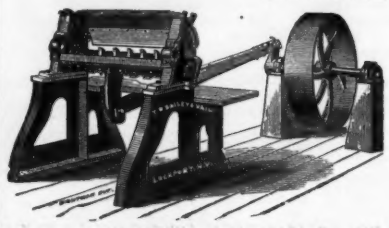

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Manufacturers of

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Send for Catalogue and prices to the trade. 71

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SOLE MANUFACTURERS OF
The Harris and New Harris
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Fine Castings and Job Work of all kinds to order. Send for prices and catalogues.
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The Griffin Road Machine Co.

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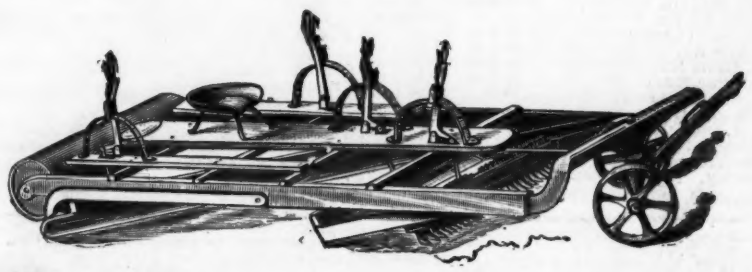

CITY SURVEYOR'S OFFICE,
LANSING, MICH., MAY 3, 1883.

The Griffin Road Machine Co.
Gents.—We have had your machine running for a month, and are highly pleased with it. It has already more than paid for itself by the saving of labor.
H. D. BARTHOLOMEW,
City Surveyor.
22

FRICTION
HOISTING ENGINES,
SOMETHING NEW IN DESIGN FOR
Double Dock Hoisting Engines

The Engines are mounted on an A frame, bolted to a strong bed-plate, and by the side of the boiler, but not dependent upon the boiler, making the most convenient double engine, taking up less space, and can do more and better work than any other of the same dimensions.

FOR RAILROAD BRIDGE Building, Pile Driving and other Heavy Work it has no equal for efficiency.

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CLEVELAND, O. 61

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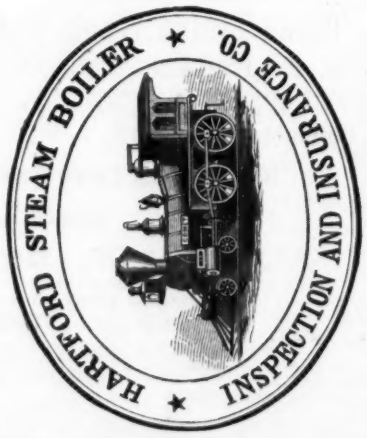
J. B. Pierce, Sec'y.



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CIRCULAR SAW MILLS.
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Patent Sets and Head Blocks for Saw Mills, and Machinery of all descriptions. I now have the agency for the celebrated

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and can supply customers with anything in this line at very low prices.

Call at Works and see them in Stock.

Also manufacturers of

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These are an entirely new style of Upright Engines, designed by F. I. Freeman, and
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They are so constructed that they can be sold for one-half the price for the ordinary style of the same sizes or power, consequently they are by far the

Cheapest Engines in the Market,

And are warranted satisfactory in every respect. They are designed especially for Saw Mills, Grist Mills and Hoisting Machines, and are high or low speed engines, running from one to seven hundred revolutions per minute; are strong and heavily built, of the best material and workmanship.

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Prompt Attention given to Repair Work.

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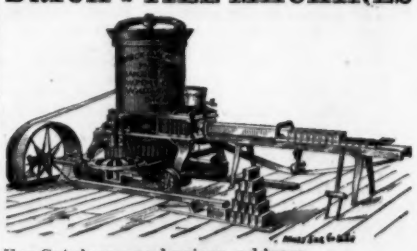

For Catalogue and prices, address
J. W. PENFIELD,
Willoughby, Ohio.
Mention this paper. 81

TRAVELERS' REGISTER.

Lake Shore & Michigan Southern.

TRAINS GOING EAST.	Arrive. From West.	Depart. From East.
Fast N. Y. Express	*1 35 a m	*1 50 a m
N.Y.,Bo't'n & At. Ex.	*7 05 a m	*7 30 a m
Elyria Accommodation	†8 35 a m	.....
Pt.Clinton Accomd'at'n	†11 00 a m	.....
Buffalo Accommodation	†11 00 a m	†11 15 a m
N. Y and B't'n Fast Ex.	*2 25 p m	*2 55 p m
Conneaut Accom'dation	.....	†4 50 p m
Night Express	†10 10 p m	†10 35 p m

TRAINS GOING WEST.	Arrive. From East	Depart. From west.
Fast Limited Express	*12 23 a m	*12 33 a m
Mich. Ex. via Sandusky	*2 50 a m	*3 05 a m
Chi. Ex. via Sandusky	†6 35 a m	7 00 a m
Mich. Ac. via Norwalk	.....	†6 40 a m
Conneaut Accom'dat'n	†8 40 a m	.....
Toledo Ex. via Norwalk	†1 25 p m	†3 30 p m
St. Louis Ex.via San'ky	*1 40 p m	*2 05 p m
Chi. Pac.Ex. via Nor'lk.	*7 05 p m	*7 35 p m
Pt.Clinton Accom'dat'n	.....	†5 00 p m

Sunday trains for Nottingham—Depart 0:00 a. m. and 2·15 p. m., return at 10:05 a. m. and 4:45 p. m.

Reference marks—*Daily. †Daily except Sunday. ‡Daily except Monday.

Cleveland, Columbus, Cincinnati & Indianapolis.

ARRIVALS.

No. 2 Col. & Cin. & Ind'polis Ex.	*7 10 A.M
No. 8 C. T.V. & W. & Clev. Accom.	10 30
No. 12 St. Louis & New York Exp.	*3 00 P.M
No 6 Indianapolis & Columbus Exp	10 20
No. 4 Columbus & Cincinnati Exp.	*3 40
No. 10 Wheeling Express	7 15

DEPARTURES.

No. 1 Cincinnati & Columbus Exp.	*8 00 A.M
No. 11 Cleve, Indianap.&Wheel'g Ex	7 10
No. 3 Special St. Louis & Cin. Ex.	**1 55 P.M
No. 5 Night Express,	*7 25
No. 7 C.T.V. & W. & Col. Accom	4 00

**This train runs daily to Indianapolis and St. Louis, and daily, except Sunday, to Cincinnati.

Cleveland, Tuscarawas Valley & Wheeling.

ARRIVALS.

Wheeling & Cleveland Express	7 15 P.M
Uhrichsville Express	10 15 A.M

DEPARTURES.

Wheeling & Cleveland Express	7 10 A.M
Uhrichsville Express	4 00 P.M

New York, Pennsylvania & Ohio.

ARRIVALS.

No. 1 New York Expess	* 6 40 a.m.
No. 7 Mahoning Valley Ac	11 55 a.m.
No. 5 Fast N. Y. & Pitts. Ex	* 1 40 p.m.
No. 3 N. Y. & Pittsburgh Ex	* 7 05 p.m.
No. 9 Youngstown & Pitts. Ac	10 15 p.m.

DEPARTURES.

No. 12 N. Y. & Pitts. Express	* 7 20 a.m.
No. 6 Youngstown & Pitts Ac	11 05 a.m.
No. 4 Fast N. Y. & Pitts. Express	* 2 50 p.m.
No. 2 Mahoning Accommodation	4 35 p.m.
No. 8 N. Y. and Pitts. Express	11 05 p.m.

* Sunday trains.

Cleveland & Pittsburgh.

	ARRIVE	DEPART
Pittsburg & Wheeling	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Alliance Accommodation	10 10 A.M	3 45
Ravenna Accommodation	8 37	5 30
Night Express	6 25 A.M	†11 40 P.M
Newberg Accom'dation	12 10 P.M	11 00 A.M
Newberg Accom'dation	1 50 P.M	12 30 P.M

† Night Express runs daily, except Saturday, by way of Wellsville, and on Saturday by way of Alliance.

Valley Railway.

	ARRIVE.	DEPART
Wheeling Junction	10 15 A.M	8 30 A.M
Canton	1 30 P.M	5 00 P.M
Wheeling Junction	6 15 P.M	3 20 P.M

Special trains leave on Sunday at 8.25 A. M. and 4.20 P. M., arriving at Cleveland at 1005 A. M. and P. M. 6.25

Depot foot of South Water Street.

Connotton Valley Railway.

	ARRIVE.	DEPA
Passenger	8 00 a. m.	8 10 am
Passenger	10 20 a. m.	2 00 p. m.
Passenger	6 35 p. m.	4 25 p.m.

Depot corner Commercial and Fifth Streets

Cleveland, Akron & Columbus Railroad.

Cleveland, Akron & Columbus Railroad, running over Cleveland & Pittsburgh Rail road to Hudson, for Akron, Columbus, etc.

	ARRIVE.	DEPART.
Mail	2 30 P.M	8 25 A.M
Express	7 30	2 00 P.M
Accommodation	10 10 A.M	3 45 P.M

"The Nickel Plate."

	ARPIVE.	DEPART
Local Passenger	10 00 P.M	3 48 P.M
Local Passenger	9 18 A.M	6 55 A.M
Conneaut Accom'dation	9 05 A.M	4 30 P.M

Cleveland to New York,

VIA THE

NEW YORK, PENNSYLVANIA AND OHIO RAILROAD.

Formerly Atlantic & Great Western Railroad)

For New York, Boston and the East. The shortest and quickest route to Pittsburgh Washington, Baltimore and the Southeast.

Until further notice trains will leave the new Central Depot, South Water Street and Viaduct, as follows:

7:20A.M. LIGHTNINGEXPRESS(daily) sleepingand hotel coaches from Leavittsburg. 9:05 a.m. To New York, Albany and Boston without change. Parlor car, Cleveland to Salamanca. Arrives at Meadville 11:20 a.m., (dinner); Franklin, 12:33 p.m.; Oil City, 1:00 p.m.; Corry, 1:00 p.m.; Jamestown, (Lake Chatauqua) 1:57 p. m.; Buffalo, 6:15 p. m.; Rochester, 8:30 p.m.; Hornellsville, 6:40 p. m., (supper); Corning, 8:25 p.m.; Elmira, 8:57 p.m.; Binghampton, 10:58 p.m.; Albany, 6:00 a.m.; Boston, 2:45 p.m.; arriving at New York, 6:50 a.m.

2:50P.M. LIMITED EXPRESS, Pull-Sleeper Cleveland to New York, (daily). Arrives at Meadville, 6:55 p. m.; Jamestown, 9;13 p. m.; Salamanca, 10:10 p. m.; Now York, 10:25 a. m.

11:05 P.M. NIGHT EXPRESS, (daily except Sunday), Sleeping Coach from Leavittsurg to New York without change. Arrives at Youngstown, 1:45 a.m.; Pittsburgh, 6:15 a. m.; Washington 9:15 a. m.; Baltimore 10:34 p. m.; Meadville, 3:50 a. m.; Corry, 5:20 a.m.; Jamestown, 6:22 a.m.; Buffalo, 9:45 a. m.; Rochester, 1:10 p. m.; Hornellsvillle 1:20 a. m.; Corning, 12:53 p. m.; Elmira 1:21 p. m.; Binghampton, 2:50 p.m.; New York 9:25 p.m.

2:50 P.M. PITTSBURGH EXPRESS, daily, through without change. Parlor Car, Cleveland to Pittsburgh, arrives at Youngstown, 5:00 p.m.; Pittsburgh, 7:48 p.m.; Washington, 7:30 a.m.; Baltimore, 8:19 a.m

4:35 P.M. MAHONING ACCOMMODATION, stopping at all way stations. Arrives at Youngstown, 7:25 p.m; Sharon, 8:30 p.m; Sharpsville 8:40 p. m; connects at Leavittsburg with train No. 20 for Meadville and intermediate points, arrives at Meadville, 11:05 p.m. Pittsburgh, 10:48 p. m.

7:20 A.M. PITTSBURGH EXPRESS, —(daily) through without change. Arrives at Youngstown, 9:50 a.m.; Sharon, 10:55 a.m.; Sharpsville, 11:05 a.m.; Pittsburgh, 12:45 p.m. Returning, leave Pittsburgh, 4:48 a.m., 8:33 a.m., and 1:13 p. m. and 4:20 p.m.

11:05 A.M. YOUNGSTOWN& PITTSBURGH Accommodation, stopping at all Way Stations, arriving at Youngstown 1:50 p.m.; Pittsburgh, 6:10 p.m. Trains arrive at Cleveland, 6:40 a.m., 7:05 p. m., 10:55 a. m 1:40 p.m., and 10:15 p.m.

☞ This is the only route by which passengers can reach Corry, Elmira, Binghampton, New York City, and intermediate points WITHOUT CHANGE. No change to Boston and New England cities.

Baggage Checked Through to All Points East

☞ Through Tickets and information regarding the route can be obtained at the office 131 Bank street, and at new Depot of New York, Pennsylvania and Ohio Railway, South Water street and Viaduct, Cleveland.

A. E. CLARK,
Gen. Pass'r. Agt., Cleveland, Ohio.

J. M. FERRIS, Gen. Man'gr, Cleveland — Pass. Agt., M. L. FOUTS, 131 Bank st., Cleveland.

TIME TABLE.
CLEVELAND & PITTSBURGH
RAILROAD.

On and after Sunday, January 21st, 1883, trains depart from and arrive at Union Station, Cleveland, (city time) as follows:

DEPART.

For the East--8:20 A.M.; 1:55 P.M., 11:35 P.M
For Alliance--3:40 P.M.
For Ravenna--5:25 P.M.
For Newburgh--10:55 A.M; 12:25 P.M.
On Sunday for the East, at 11:35 P.M.

Train leaving for the East (week days) at 1:55 P.M. has sleeping car through to Philadelphia and New York.

Train leaving for the East every night at 11:35 has sleeping car to Pittsburgh.

On Saturday night the train for the East leaving Cleveland at 11:35 runs from Alliance to Pittsburgh via P.F.W. & C. Railway.

ARRIVE--(Week Days.)

From the East--6:20 A.M.; 2:25 P.M.; 7:25 P.M
From Alliance--10:05 A.M.
From Ravenna--8:32 A.M.
From Newburgh--12:05 P.M.; 1:45 P.M.

Time tables, rates of fare, through tickets and further information can be obtained from M. G. Carrel, agent, Union Station, or C. L. Douglass, No. 212 Bank street.

WM. A. BALDWIN, Manager, Pittsburgh, Pa. — E. A. FORD, Gen. Pass. Agt.

Bee Line.

Cleveland, Columbus, Cincinnati & Indianapolis Railway.

The Great Central Trunk Route to the Ohio and Mississippi Rivers.

Three Trains Week Days,

TWO TRAINS SUNDAY.

Leave Cleveland with Through Palace Coaches and Elegant Sleeping Cars for

Columbus, Cincinnati,

Indianapolis, Terre Haute

and St. Louis

Without Change.

☞ This is the only line making Direct Connection with all the principal Trunk Lines of the East for all Southern, Southwestern and Western points, either by way of Cincinnati, Indianapolis or St. Louis for all railway towns in Missouri, Arkansas, Texas, Kansas, Nebraska, Colorado, New Mexico, Old Mexico and the Pacific Coast.

Equipment New and Comprising all Modern Improvements.

The Best Roadbed and Safest Road in the West.

Tickets by this popular route for sale at all regular ticket offices.

E. B. Thomas, General Manager. — **O. B. Skinner,** Traffic Manager.

A. J. Smith,
Gen'l Pass. Agent, CLEVELAND, O.

Address, TAYLOR MFG. CO., Chambersburg, Pa.
(Please Mention this Paper.)

Blue Grass Route of Ohio

TIME TABLE.

In effect May 28, 1883.

The Cleveland, Mt. Vernon and Delaware RAILROAD.

GEO. D. WALKER, RECEIVER.

SOUTH-BOUND TRAINS

	Mail.	Expr'ss.	Acc'm	Acc'm
Leave.				
Cleveland	8 25 am	2 30 pm	3 45pm	.....
Hudson	9 40	3 35	5 00	.....
Cuyahoga F's.	9 58	3 53	5 24	.....
Akron	10 14	4 08	5 40	.....
Clinton	10 46	4 44	6 11	.....
Warwick	10 51	4 49	6 16	.....
Orrville	11 25	5 32 S	6 40	.....
Fredricksburg	11 55	6 02	7 13	.....
*Holmesville	12 05	6 12	7 23	a. m.
Millersburg	12 18	6 25	7 35	5 25
*Killbuck	12 31 pm	6 38	.....	5 38
Gann	1 08	7 15	.....	6 35 B
Danville	1 19	7 26	.....	47
Gambier	1 39	7 46	.....	7 07
Mt. Vernon	1 49	8 00	.....	7 19
*Mt. Liberty	2 12	8 22	.....	7 40
Centerburg	2 24	8 34	.....	7 52
*Condit	2 38	8 48	.....	8 06
*Sunbury	2 48	8 58	.....	8 16
Westerville	2 09	9 19	.....	8 38
Columbus	3 35	9 45	.....	9 05

NORTH-BOUND TRAINS

STATIONS.	Expr'ss.	Mail.	Acc'm	Acc'm
Leave				
Columbus	7 10 am	12 10 pm	.....	5 20 pm
Westerville	7 35	12 35	.....	5 48
*Sunbury	7 56	12 55	.....	6 10
*Condit	8 06	1 04	.....	6 21
Centerburg	8 19	1 17	.....	6 35
*Mt. Liberty	8 30	1 28	.....	6 47
Mt. Vernon	8 53	1 49	.....	7 12
Gambier	9 05	2 00	.....	7 25
Danville	9 25	2 20	.....	7 46
Gann	9 37	2 32	.....	7 57
*Killbuck	10 14	3 08	.....	8 33
Millersburg	10 28	3 22	5 45am	8 45
*Holmesv'e	10 40	3 34	5 58	.....
Fredricksb'g	10 50	3 44	6 08	.....
Orrville	11 25	4 15	7 10 B	.....
Warwick	11 52	4 39	7 37	.....
Clinton	11 58	4 44	7 46	.....
Akron	12 32 pm	5 14	8 20	.....
C'yahoga F's	12 46	5 26	8 33	.....
Hudson	1 05	5 43	8 53	.....
Ar. Clevel'd	2 25	6 55	10 10	.....

Stop on signal. B Breakfast. S Supper.

N. MONSARRAT, Gen'l Supt. Akron, O — E. T. AFFLECK, General Passenger Ag't, Columbus, O.

THE NICKEL PLATE.

New York, Chicago & St. Louis Railroad.

The passenger equipment of this new trunk line is all new and is supplied with the latest appliances necessary to safe, speedy and comfortable travel.

At Chicago, Passenger Trains arrive at and leave Union Depot, Van Buren street.

Following is the time in effect May 14, 1883, and until further notice:

GOING EAST.

	Local Pass'n'gr	Local Pass'ngr.	Con'eaut Accom.
Lv. Chicago	8 15 am	.....	.....
Ar. Valparaiso	10 05	.....	.....
" Ft. Wayne	1 30 pm	.....	.....
" New Haven	2 05	.....	.....
" West Leipsic	4 09	.....	.....
" Arcadia	5 10	.....	.....
" Fostoria	5 25	.....	.....
" Gr. Springs	6 12	.....	.....
" Bellevue	6 40	.....	.....
Lv Bellevue	6 55	8 30 am	.....
Ar Cleveland	9 20 pm	10 55	.....
Lv Cleveland	.....	11 00	5 00 pm
Ar Painesville	.....	12 06 pm	6 15
" Ashtabula	.....	12 58	7 11
" Conneaut	.....	1 25	7 40
" Erie	.....	2 28	.....
" Dunkirk	.....	4 21	.....
" Buffalo	.....	6 00	.....

GOING WEST.

	Local Passn'gr.	Local Pass'ngr.	Con'eaut 'Accom.
Lv Buffalo	10 15 am	.....	.....
Ar Dunkirk	11 56	.....	.....
" Erie	1 35 pm	.....	Leave.
" Conneaut	2 53	.....	6 10 am
" Ashtabula	3 25	.....	6 39
" Painesville	4 19	.....	7 36
" Cleveland	5 25	.....	8 50
Lv Cleveland	5 30	7 15 am	.....
Ar Bellevue	7 55	9 30	.....
Lv Bellevue	.....	9 40	.....
Ar Gr. Springs	.....	10 07	.....
" Fostoria	.....	10 46	.....
" Arcadia	.....	11 00	.....
" West Leipsic	.....	11 58	.....
" New Haven	.....	2 05 pm	.....
" Ft Wayne	.....	2 20	.....
" Valparaiso	.....	6 25	.....
" Chicago	.....	8 20	.....

Commencing Sunday, June 17, 1883, trains between Cleveland and Rocky River, (on Sundays only), will run as follows:

WESTWARD.

Leave Cleveland—(Broadway Station)
8 15 a.m; 9 50 a.m; 12 50 p.m; 4 10 p.m; 7 00 pm.
Pearl Street—
8 23 am; 9 58 am; 12 58 pm; 4 18 p m; 7 08 pm.
Lorain Street—
8 30 am; 10 05 am; 1 05 pm; 4 25 pm; 7 15 am.
Arrive River Bank—
8 55 am; 10 30 am; 1 35 pm; 4 50 pm; 7 40 pm.

EASTWARD.

Leave River Bank—
9 00 am; 12 00 noon; 3 20 pm; 6 00 pm; 8 20 pm.
Arrive at Cleveland (Lorain Street—
9 25 am; 12 25 pm; 3 45 pm; 6 25 pm; 8 45 pm.
Pearl Street—
9 32 am; 12 32 pm; 3 52 pm; 6 32 pm; 8 52 pm.
Broadway Station—
9 40 am; 12 40 pm; 4 00 pm; 6 40 pm; 9 00 pm.

Trains run by Columbus time, which is twenty minutes faster than Chicago, five minutes slower than Cleveland, and sixteen minutes slower than Buffalo time.

For information, call on nearest Agent of the Company or address

B. F. HORNER, Gen'l Passenger Agent,
LEWIS WILLIAMS, General Manager, Cleveland, O.

REST not, life is sweeping by, go and dare before you die, something mighty and sublime leave behind to conquer time." $66 a week in your own town. $5 outfit free. No risk. Everything new. Capital not required. We will furnish you everything. Many are making fortunes. Ladies make as much as men, and boys and girls make great pay. Reader, if you want business at which you can make great pay all the time, write for particulars to H. HALLETT & Co., Portland, Maine.

Electric Light Litigation.

Bradstreet's: An electric light litigation appears to be already begun in New York. With all the conflicting claims between Edison, Brush, the Faure storage battery people and the Swan element of the Brush Company, it has been a matter of comment that proceedings have not been started long before. But the wind is blowing from an entirely different quarter. Bills in equity were filed several days ago in the United States Circuit Court in suits begun by the Consolidated Electric Light Company against the Edison Electric Light Company the Edison Company for Isolated Lighting, the Edison Illuminating Company, Mark Mayer and Delia Jacobs. The complaints are alike in substance in all cases. It is claimed by the plaintiffs that patents were granted June 25, 1878, to William E. Sawyer and Albon Man for a system of electric lighting. At subsequent dates in 1879 and 1880 patents were granted to the same persons for improvements in regulators for electric lighting in electric lamps, in the treating of carbons for electric lights, and for improved carbons and regulators. These patents were assigned several times, and in this manner came into the hands of the plaintiffs in this suit. A reissue of patent on amended specifications was obtained June 6, 1882. It is charged that the defendants have used a system of electric lighting substantially the same in principle and construction as that covered by the patents belonging to the plaintiff. It is also charged that regulators and carbons have been used that infringe upon the patents. Writs of injunction are asked for to restrain the defendants from making, using or selling such inventions.

Aluminum-coated Iron.

Dr. Gehring, of Landshut, has invented a process by which ordinary iron may be rendered highly ornamental. The invention—of which, however, we have heard very little lately—of obtaining aluminum very cheaply led Dr. Gehring to coat iron with aluminum, in the same way as iron plates are now tinned, and converted into tin-plates. The inventor states that his process is inexpensive. He uses a Bunsen burner with a blast or a muffle, and is thus able to manufacture various objects of the durable metal for daily use, the coating of aluminum giving them a silver white luster. He also produces a gold luster or any other color, and even an enamel coating, all of which substances are said to adhere very firmly to aluminum. Aluminum, like tin, does not oxidize under normal conditions, and even stands the heat of an ordinary fire, while it is much more lustrous than tin.

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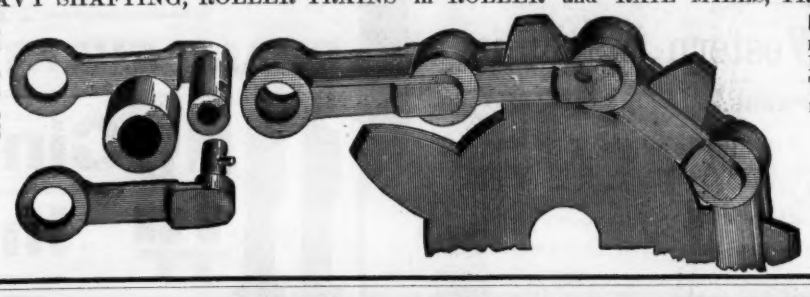

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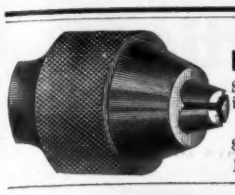

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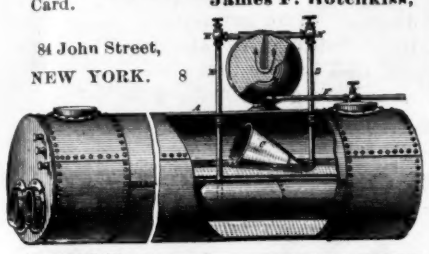
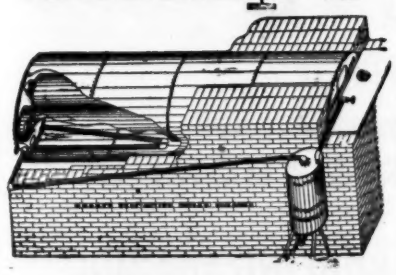


Sharp's



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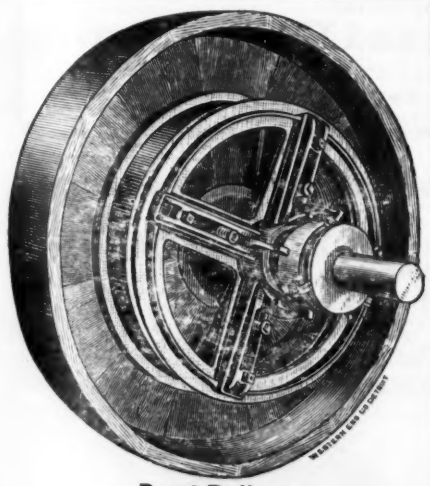

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The grate is hinged at its extreme back edge, and when dumped gives a clear opening into a large ash-pan. It can be partially dropped to remove clinkers from the front.
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Its neat design, nicely polished edges, nickeled panel plates and trimmings, give it a very attractive appearance.
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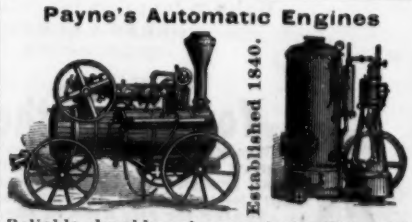

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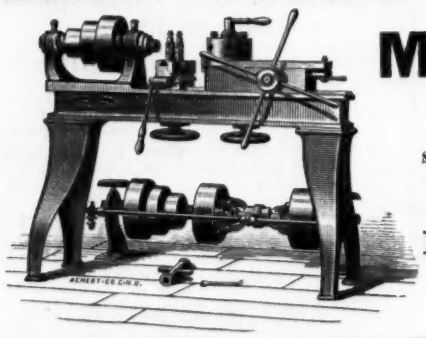

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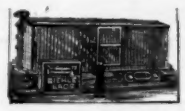

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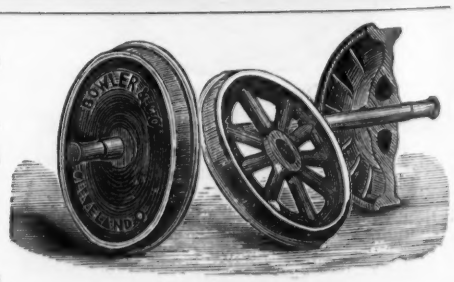

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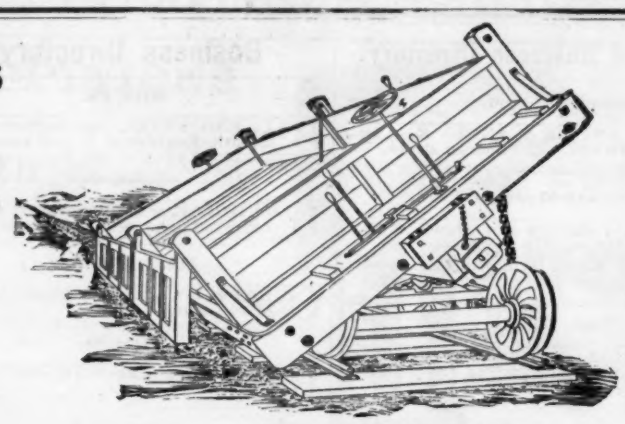
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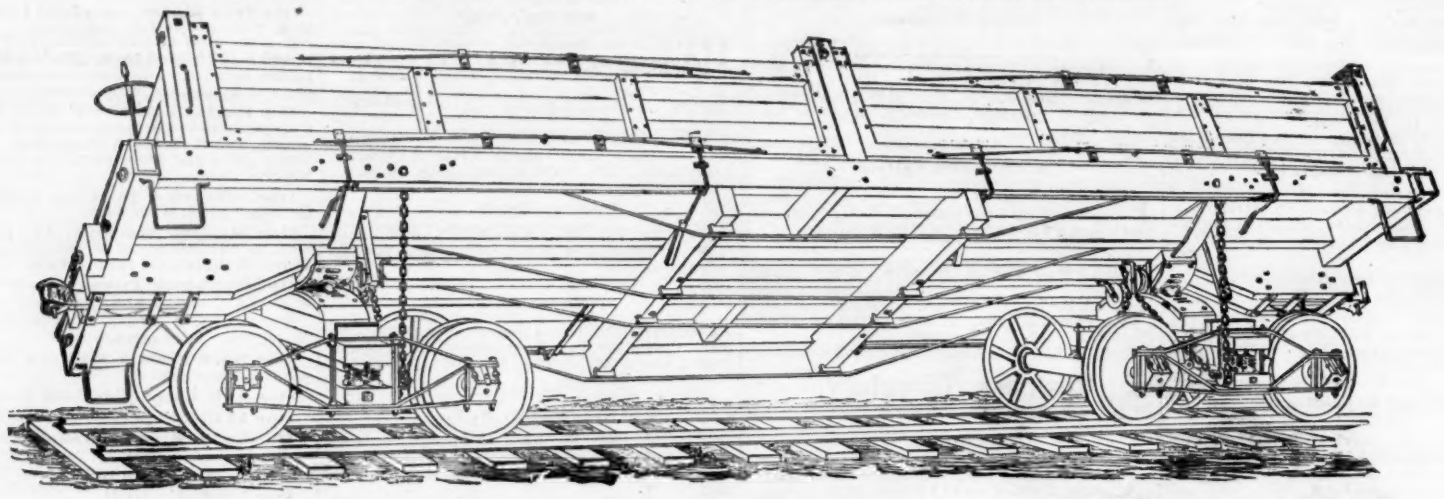
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